# CARNATION CULTURE UP-TO-DATE

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BY

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# PREFACE.

In the year 1910 the firm of Allwood Bros. was founded, and with it the first edition of "The Perpetual-Flowering Carnation" was published and became the standard work of this beautiful flower. Since then, at the request of our Editor, and my enthusiastic friend, Mr. T. Want, I have been called upon to write no fewer than four editions of an abridged section of this work, proving the great advance that has been made with the Carnation and its hybrids.

Its ever-increasing popularity is also shown in the fact that from a commencement of four small greenhouses, employing three men and two boys, the firm of Allwood Bros. to-day controls three large nurseries covering many acres of glass, and finds employment for over 200 people; a convincing proof that no flower has won itself more rapidly into favour with

the floral loving public than the "Divine Flower."

The methods of cultivation also have advanced to such an extent that in this, the fifth edition of this small handbook, it is possible to describe many new ways, as practised by our leading growers, many of whom are experts in their respective sections, such as Propagation, Plant Production, and Hybridising, etc., etc., also by my brother, George W. Allwood, whose wide reputation in the production of Carnation bloom is recognised both in this country and America. Also, assisted by our Mr. Richard Brant, I have endeavoured to give to my readers the reflex of a life's study and practical experience; knowledge that will assist them to grow better Carnations—Carnations that they will grow with pride and personal satisfaction, with the guarantee of Allwood Bros'. name and its long-established reputation behind them.

MONTAGU C. ALLWOOD.

Wivelsfield Nurseries,
Hayward's Heath, Sussex.

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# FOREWORDS.

## THE MODERN CARNATION FAMILY.

THE history of the Dianthus and its evolution does not come within the scope of this work, yet I feel it necessary to describe in a few word the various sections of the Carnation family which I am dealing with here; how the modern types have evolved out of the old, also how some of the newer races have been created, so that there will be no confusion in the readers' minds as to their uses and methods of cultivation.

*Perpetual-Flowering Carnation*, also called American Carnation and Tree Carnation, is very closely allied with the Romontant Carnation It flowers in mildly heated greenhouses the entire twelve months of the year, also can be grown in cold greenhouses.. It is used for summer bedding with good success, but in many districts will not withstand the winter out of doors.

*Perpetual-Flowering Malmaison*, the old type of Sour de la Malmaison, which only flowered in the early summer is now almost entirely superseded by the modern Perpetual Malmaison, which has quite as large a flower, and blooms

under glass the entire year, but is rarely a success in cold greenhouses or out of doors; it is the aristrocrat of the Carnation world, and is cultivated exactly the same as the Perpetual-Flowering Carnation.

*Border Carnation:* this is the oldest type, Selfs, Bizaires, Flakes, Cloves, Picotees, Yellow grounds, White ground Picotees, etc., are simply classifications made according to the various colour markings, etc. This is the old type of outdoor Carnation, which flowers during the mid-summer out of doors, some of the exhibition varieties must be grown entirely under glass in cold frames or greenhouses.

*Perpetual Border Carnation.* This new race was first raised and disseminated by Allwood Bros., in the year 1910, it is a hybrid between the Perpetual-flowering Carnation x Border Carnation, it is the ideal race of hardy, outdoor Carnations exceedingly robust in constitution, withstanding the severest winter out of doors, and flowers in the open from spring to winter.

A splendid cold greenhouse plant. They have all the colours represented in the old Border type, in short, it is to the Carnation what the Hybrid Tea is to the Rose.

*Border Pinks* and Laced Pinks are old garden favourites which bloom in the early summer, the Laced Pink is a more delicate and refined race, developed many years ago mainly for exhibition purposes, they require more careful cultivation.

The Pink comes from quite a distinct origin to the Carnation, and they flourish in almost

any sunny garden without protection or special care.

*Dianthus Allwoodii*, a hybrid race of hardy garden plants—Perpetual-Flowering Carnation x Hardy Border Pinks, they flower in any sunny garden from spring to winter, and being of mongrel origin have a most hardy and robust constitution, growing much more quickly than the common Pink, and produce many times more bloom. When protected with glass in the autumn they flower up to Christmas, and can be forced into bloom in the early spring with gentle artificial heat.

Furthermore, these new additions to the Carnation family have brought the plant within the scope of all who have a garden or window box, and a shilling to spend.

The Perpetual-flowering Carnation and Malmaison will always be more expensive, because they can only be grown to their best by the fortunate who possess a heated greenhouse. However, the hardy outdoor races are quite as beautiful.

There are very few gardens or greenhouses where Carnations cannot be successfully grown, and after reading the thousands of letters we receive from all classes of Carnation growers, and talking Carnation difficulties with the hundreds of people I meet, I am convinced that there are just the few following reasons for partial failure; lack of direct light; lack of lime in the soil; the presence of leaf-mould or Peat in the soil, or too much coddling.

[Elliot & Fry.

THE AUTHOR.

Montagu C. Allwood

# CARNATION CULTURE UP-TO-DATE.

## CHAPTER I.

### PROPAGATION.

PERPETUAL-FLOWERING, PERPETUAL BORDERS, AND ALLWOODII.

THE years that I have spent in the culture of Carnations and their hybrids, and the close study of their habits, has made me realise more and more the absolute importance of good stock. The deterioration of varieties of Carnations is obvious to all intelligent cultivators. This is due to many causes, but careless propagating is the chief.

A poor cutting may be taken from a good plant, or, on the other hand, an apparently good cutting may be taken from a plant weak in constitution, or sickly, or overfed. The cutting itself may be weakened by too high a temperature in the propagating house, or by having to sustain itself too long without roots, by reason of unsuitable conditions while rooting; or by remaining too long in the sand after rootlets have been emitted, before being potted;

or by attacks of disease; or by improper growing. There are a hundred and one reasons which would result in bad cultivation.

In selecting the cuttings which are to make the plants for next year's stock, try not only to perpetuate the good qualities of the variety, but aim at improving them. The mere taking of a lot of cuttings promiscuously from the plants, and inducing a large quantity to root, does not constitute skilful propagation. There is no doubt that the cutting reproduces in all details the plant from which it was taken.

I believe in selecting, as far as possible, a uniform average size in cuttings, avoiding the abnormally large as well as the small cuttings, because from an even, uniform lot of cuttings a uniform lot of plants results. It is unwise to attempt to root small cuttings which have no energy stored up within them, because a week or ten days longer on the parent plant will make first-class cuttings of them.

I dwell upon this matter of careful selection of cuttings, because I realise the importance of it. I feel I cannot write too strongly, nor emphasise too emphatically, the vital importance of selecting only the very best and strongest cuttings. The difference in the plants produced from good and bad cuttings of the same variety is as distant as the Poles. Because the price is low it does not naturally follow that the goods are cheap, nor because the price is high does it follow that they are good, yet, as a rule, the two go together.

Over-propagation of seedlings previous to their being sent out, or afterwards, has ruined

the constitution of all too many promising novelties in the past.

### Stock Plants.

The stock or parent plants should be grown in a good light, and under normal conditions, and should be plants that have not been fed to excess. In feeding avoid fertilisers with any forcing element, but use a cool, slow-acting manure, one that is more a food than a stimulant, and which will build up the plant. Cuttings from such a plant would be strengthened rather than weakened.

The plant which is precocious, and produces a large crop of bloom, is not necessarily the best type of plant for stock purposes. I would prefer those which are distinguishable during the summer by their short, compact growth, and healthy appearance, and produce a continuous crop of bloom.

### Seasons for Propagating.

*Perpetual-Flowering Carnations.*—The large commercial growers, with hardly an exception, propagate their cuttings in December, January and February; however, in many private gardens, particularly in the Midlands, North of England and Scotland, autumn-rooted cuttings are favoured. These, as a rule, are wintered in cool greenhouses after being potted off, so to avoid a weak winter growth. We who do a considerable export business are compelled to propagate practically all the year round.

*Perpetual Border Carnations.*—Those grown in a heated greenhouse can be propagated as

Perpetual-flowering Carnations, but those grown in a cold greenhouse are best propagated in the autumn and spring, while those growing in the garden like the old Border Carnation can be layered in the summer, or cuttings root readily from May to October. We prefer June and July rooted cuttings for plants which are to winter in the garden.

*Dianthus Allwoodii.*—The propagation of these is the same as the Perpetual Border Carnation, except that we do not advise anyone to cultivate Allwoodii in pots under glass for propagation purposes, only for forcing purposes. Such stock is most unsuitable for propagating, being exhausted; also it is natural for Allwoodii to rest in the winter.

## Cuttings.

First, realise that the cuttings will reproduce the parent plant and its conditions at the time it is taken off, in habit, health, colour of flower, and, in fact, in all details. Therefore, propagate perfect cuttings only, from the most vigorous growths of the plant. The importance of such judicious selection should not be underestimated. A cutting removed from a plant which is dry at the root rarely takes root. The old growers used to prefer the base cuttings, that is, those which are produced from the main stem of an old plant just above the ground; but experience has taught us that these are in no way so prolific as those produced higher upon the flowering growths of the plant —indeed, if we repeatedly take the stiff, half-dormant cuttings from the base of the plant or

Fig. 1.

A flowering growth, with cuttings fit for removing. The top cutting is undesirable, having a leggy stem. The centre three are correct cuttings. The bottom growth is a slow growing, dormant, useless cutting.

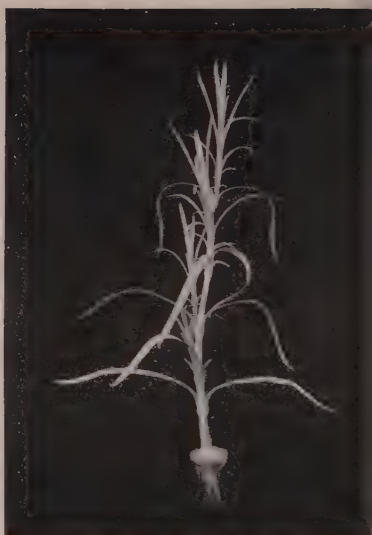


Fig. 2.

A flower growth, with the flower out, causi it to produce cuttings. The top three are go cuttings, and should be removed with a he The lower two are slow, dormant growths, un to be used for propagating.

A Fig. 3. B

A.—Correct heel cutting ready for inserting into sand. B.—Correct piping cutting; trimmed ready for insertion.

A Fig. 3C. B

A.—An inferior heel cutting removed from to high up on a flowering growth. B.—A long jointed weak piping cutting. Both of the abov types can never grow into strong plants.

branch, they will eventually produce hardly any bloom at all, but an abundance of fine foliage, and useless cuttings.

Likewise, the thin top cuttings, which have a stem before the first set of leaves, as seen in Fig. 1, should be avoided, for they will never make a strong, shapely plant, but will produce an abundance of small flowers with weak stems.

The correct cutting is found between these two opposite sets of cuttings, being produced on the flowering growth, where it is thickest, and where there is a short space between the leaves, whilst they have practically no space at all between their leaves (see Fig. 1).

As a rule a cutting is ready to be taken from the parent plant when the bud is just bursting, but this cannot be taken as binding, as each variety has its own peculiarities, and some do not produce cuttings until after the flower has been cut, as seen in Fig. 2.

The heel cutting (Fig. 3) should be taken off with a gentle downward pull, and should come away with a small portion of bark from the flower stem intact. This should be trimmed off with a sharp knife, but if it comes away without any of the main stem, it can be taken that it is too soft, and will not root. If, on the other hand, it comes away with a long tail of bark from the flower stem, it is too hard. All this will be easily learnt by experience. To imagine that the top of any vigorous growth is a cutting is wrong, for whilst it can be taken off as a piping, and rooted, it never makes a good plant, simply because we do not get the

complete growth, but only a part, or, in other words, the top of the shoot. I wish to warn the reader against using the tops of young plants as cuttings. This is one of the most ruinous practices I know, for such cuttings can only produce weakened, disease-ridden plants. No matter how healthy the tops may look, they are useless as cuttings, and when the young plant has to be stopped, the tops must be destroyed.

### Piping Cuttings.

Where many thousands of cuttings are required, special plants have to be grown purely for propagating. With this class, cuttings are taken in the old way, viz., by piping (see Fig. 3B), which is simply to pull them out at a joint; but, again, it is only when the wood is in a correct condition that they will pull out at a joint, so that the joint is exactly halved in the operation. In short, correct wood for propagating is that which is in a half-matured state. However, with the modern Carnation, cuttings will root readily if cut just under the joint or pair of leaves, which should be removed as shown in Fig. 3B.

A shoot or growth which has run off for flower—"spindling," as we term it—is useless as a cutting, and should be allowed to flower, or be pinched back to break, and so produce cuttings.

The average cutting in the majority of varieties is from two to three inches long, and should have about four fully developed leaves. The only times a knife is used is to trim off

the short curly leaves for about three-quarters of an inch up, or to remove the small tail of bark on the heel of the cuttings, and in the piping cutting just to shorten back any leaves which would touch the sand. For this the knife should be as sharp as possible.

To massacre the plants simply for cuttings is folly, for this leaves them in a depleted state. It is impossible to get a maximum number of both cuttings and flowers, because if the cuttings were not removed they would eventually flower. Our plants average nine cuttings each; this allows them to continue flowering the entire ten months, and we do not remove more than three cuttings from one plant at the same time, thus never distressing them, nor causing a check.

### Rooting Mediums

Many different materials can be used as a medium in which to strike cuttings. Sifted coal ashes, or pulverised cinders mixed with sand, may be used. Peat and sand; cocoanut fibre, or ground sphagnum moss, and sand; even wood ashes and sand, or loam and sand are quite common. The latter for summer propagating is to be recommended. But whatever is used, it must be perfectly sweet, or the scourge of the propagating bench, fungus, will destroy all efforts. I am a strong believer in sharp, clean sand, free from any decaying matter, and of a medium texture, in which to root cuttings. We use exclusively on all our three nurseries a river sand which is rather expensive to dredge, but we consider that for

propagating the best is only good enough. Some may think that pure sand would have a weakening effect upon the cutting, but in practice this is not so. On the contrary, the cutting keeps much fresher in it; hence rooting with less effort and a minimum amount of check.

It will probably occur to the reader that if a cutting is rooted in sand, as soon as it commences to make root it has nothing to feed upon. That calculation is sound logic. But, again, if a cutting which is rooted in sand and loam makes four or five separate roots to start, whereas one rooted in pure sand makes seven to ten, the odds are that the latter will make the better plant, and that is exactly the case. Do not allow the cuttings to grow in the sand; pot them off when rooted.

We make it a rule never to use the same sand twice for propagating purposes, fresh sand giving the best results.

### Heat for Propagating.

Bottom heat is not absolutely necessary for rooting Carnations; in fact, old growers used to think that better plants were produced if no bottom heat was used. But with slight bottom heat undoubtedly better results are obtained, though ten degrees more bottom heat than top temperature is quite sufficient, and more would be harmful. Sixty degrees bottom and fifty degrees top heat is ideal.

Bottom heat does not draw the roots, as is sometimes supposed, for the emission of roots

is a natural function on the part of the plant. Root formation and root growth, like top growth, is more rapid in a high temperature than in a low one, but as the Carnation loves coolness it cannot stand forcing beyond its natural temperature, and therefore it should be grown cool. By having ten degrees lower top heat than bottom heat the top growth of the cutting is kept almost stationary. The object should be to prevent the cutting from growing while it is rooting.

Twenty-one days is the minimum time in which I have known a Carnation cutting to root under correct conditions, whilst twenty-eight is the average. Odd varieties will take thirty-five days.

Naturally it will be understood that artificial heat is only necessary from October to April, also it will be found almost necessary to propagate the cuttings in greenhouses during these months, but a cold frame placed in semi-shade, is excellent for the rest of the year.

### Attention to Cuttings.

It is not difficult to define clearly what should be done, and how it should be done, in the matter of removing and making Carnation cuttings, but it is more difficult to lay down rules for after-treatment, because the successful propagator does not work by rule of thumb, but is guided by circumstances. The experienced grower can tell by the appearance of his cuttings if they are right or not, and in what stage of rooting they are, and he avoids, rather

than rectifies, trouble. I can give main laws for guidance, but the by-laws must be made by the person concerned, and I might add that the details are of the greatest importance.

On bright, sunny, or windy days evaporation is very rapid, and the cuttings often suffer if not adequately shaded, or in some way protected. Many growers fall into the error of repeatedly spraying the cuttings overhead to counteract this, and go to extremes in this matter. We favour having paper placed over the cuttings on very bright days, which acts as a shade, also stops evaporation, while a blind or mat outside the greenhouse or frame is necessary to minimise the heat. During the hottest summer months a double shade, one a few inches above the glass, may also be necessary to minimise the heat.

### Propagating for Amateurs.

The best means of propagating Carnations for amateurs is to have a small span-roof propagating frame, as shown in Fig. 4. At the bottom should be placed iron or wooden rails, upon which a layer of soft bricks should be put to form the bottom. The sides of the frame should be twelve inches deep, which will allow the cuttings to be clear of the glass. The roof should consist of separate pieces of glass, so that air can be given as required. In the summer-time this can be stood in semi-shade.

In winter the warm end of an ordinary greenhouse, provided the light is good, is ideal for propagating Carnations. Hang a curtain of tiffany round the sides of the case, in order to

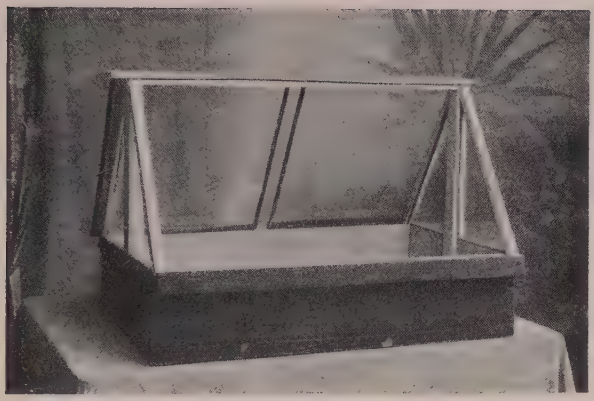


**Fig. 4.**

An ideal Carnation propagating frame for amateurs, with movable glass, which allows for an abundance of ventilation.

**Fig. 5.**

Pan of rooted cuttings

direct the heat from the pipes on to the bricks at the bottom. The required heat is thereby easily obtained.

For the amateur who is rooting Carnations in small quantities, well-drained propagating pans are undoubtedly the best. They should be four inches in depth, which will allow ample room for crocking, with a layer of sand three inches deep. (See Fig. 5.) The advantages obtained by using pans instead of pots are manifold. A much larger body of sand is obtained for use, which does not dry out so readily. It is also possible to make the sand firmer and more compact than when pots are used. In cases, however, where it is found necessary to use pots, it is best to use 5-in. pots, with two inches of drainage at the bottom. Cover the drainage with a thin layer of fibre, and fill the pots to within half an inch of the top with pure, clean sand. Firm the sand well down in the pots, and give a good watering to settle it in position, otherwise the cuttings will not stand upright when they are watered in.

The cuttings should be dibbled in a quarter of an inch deep, and one and a-half inches apart. Take great care when inserting them that the base is resting well on the sand. Gently but firmly close the sand on the base of the cuttings. Give the pots or pans a good watering overhead to settle the sand well around the cuttings. Finally, allow them to drain for a few moments before placing them in the propagating case.

It is important that the pans or pots should be plunged up to the rims in ashes or cocoanut

fibre, to prevent them drying out. But by any method, shade from the sun, and never allow a draught to blow in upon the cuttings. A good light is most essential. As soon as the cuttings are callused, admit air by degrees, and eventually remove the glass altogether.

It should be remembered that different varieties take different times to root, hence it is better for the small grower to have his individual varieties in separate pans, so as to enable him to remove them from the frame as they become rooted.

In this country, with its weak winter light, causing a soft growth, I maintain that the cuttings should be protected from the air during the day by covering the case with glass, this being removed at night, and put on later each day until, after fifteen days or so, it is not used at all. If you have air upon the greenhouse, as you naturally would if it is a house full of growing plants, then treat the propagating case as a miniature greenhouse, not removing the glass entirely at night, but putting air on gradually, increasing it each few days until the cuttings commence to root, when the glass should be dispensed with.

A small propagating case can be made with a 12-in. or 16-in. pot. Put good drainage in the bottom, with crocks or similar material. Fill to within five inches of the top with clean sand, and damp down lightly. Dibble in the cuttings one and a-half inches apart, watering them in well, and place a piece of glass upon the top of the pot, standing the whole on the stage, directly over a flow pipe, or indeed any

pipe, so as to get a suitable bottom heat of about fifty degrees. Ventilate for about one hour and a-half early each morning until rooted.

Some private growers simply put the cuttings into a pot in a sandy compost, and place the same in a cosy corner, sprinkling and shading daily; but plants propagated in this way receive a check, although we all know of certain people who put in cuttings or slips in every odd corner of their garden, and these grow away most splendidly, without any trouble.

In using a dibber to put in the cuttings, it should be remembered that the bottom of the dibber should be the same size as the base of the cutting, and the cutting must rest upon the sand. Many cuttings are bruised whilst being firmed in. The air should be simply excluded from the base of the cutting. It is quite a common practice to layer Perpetual Carnations in precisely the same way as the Border varieties, but these matters will be dealt with later.

## CHAPTER II.

### GROWING YOUNG PERPETUAL-FLOWERING AND PERPETUAL BORDER CARNATIONS UNDER GLASS.

THE influence brought to bear upon the early youth of plants seals, to a very large degree, their future destiny. A cool-grown, hardy young Carnation may not have quite so attractive an appearance to the untrained eye as stock potted in very rich soil, and grown in an abundance of moisture and heat. The latter will make a heavy, soft spring growth, which too often misleads the inexperienced. Yet it is like comparing a spoilt boy with an athlete. To obtain the best results from Carnations, it is imperative to commence with good stock, and this can only be obtained by normal treatment. You cannot expect to buy such at the same price as you would the more quickly and cheaply-grown stock.

As I have already pointed out, previous to potting or planting the rooted cuttings, they should be hardened, to withstand light and air, so as to minimise the check. It is most essential that a young Carnation should be grown in a strong, direct light; and if the cutting has been rooted hardy and cool, only slight shading from the strongest sun for a few days is

Inferior rooted cuttings, which cannot make good plants.

Correctly rooted cuttings which will grow into strong, healthy plants

required, while it is never wise to allow them to be in a great heat, nor for them to lack air, even when freshly potted.

### Lifting the Cuttings.

The cuttings must be lifted from the sand with care. A thin piece of wood about two inches broad is the best implement to use. Place the rooted cuttings in a damp box, only taking up a few at a time, so as to avoid injury from exposure to the air.

### Position for Young Plants.

The best care and the best position in the greenhouse or garden is none too good for the young Carnation stock. It is folly to select only the best cuttings, and take every care in their propagation, if this good work is to be destroyed later. Too often the young plants are looked upon as a sort of necessary evil, and, being non-productive of bloom, are crowded into any out-of-the-way place, regardless of surrounding conditions.

It is not wise to pot the young Carnations off into too airy a position. A small greenhouse with a temperature of fifty degrees at night in winter is best, and a suitable position can often be provided on a side stage of the Carnation house. Failing that, in the case of small quantities, they can be put back into the propagating case, or a sub-propagating case, for a few days until established.

The ideal position for growing young Carnations, when established, is one receiving full sun and an abundance of air, with a night

temperature of about fifty degrees. A large, soft growth should be avoided. Strive for a sturdy, well-matured young plant.

### Perpetual Borders and Allwoodii in the Garden.

It is not at all necessary to pot cuttings of these off when rooted in the early summer. After being hardened they can be planted direct into the garden, providing that the soil has been well prepared; or temporary quarters in the vegetable garden will do, because the young plants transplant readily.

### Soil for Young Carnations in Pots.

No matter under what system the Carnations are to be grown, a similar soil will be required, the foundation of which should be good loam. What is termed stiff, yellow loam, is best, but, failing that, practically any maiden loam will do. This matter is fully dealt with in the next chapter.

The addition of sand depends upon the loam and the time of year. If the loam is particularly heavy, then add more sand. Likewise, when potting cuttings in December, the soil should be lighter than in March.

The addition of manure or fertilisers is also a question of season. We only add old manure to the soil after February. For first potting we use as a general compost, five-sixths loam, one-twelfth sand, and one-twenty-fourth wood ashes and mortar rubble. I am a strong advocate of a plain diet. A pure loam with sufficient sand added, making it porous and open,

is the best and safest compost for young Carnation cuttings. The whole should be passed through a quarter-inch sieve.

Soil for potting Carnations is in the correct condition for use when just moist enough to press into a ball with the hand, but not so moist that it will not crumble readily when broken up. Root action is encouraged best in a moderately moist soil—one which entices the roots to search for moisture. Care should be taken to have the chill off the soil before using it. This is easily done by allowing it to remain in a warm shed or greenhouse for a few hours.

### Pots.

The young roots do not take hold of the soil so readily during a dull season, so a small pot for the first potting is a vital point. A 2-in. pot is ample in size for a freshly-potted cutting in winter. This enables it to go straight away with a much minimised check, and establish itself within three days. Have the pots dry and wipe them out well, to clean them thoroughly before being used. We find there is no occasion to crock so small a pot.

### Potting in Winter.

There is more art in potting plants than appears on the surface, especially if speed is required as well as good work. Every good workman has a system, and should work like a clock, hence a sub-chapter is allotted to this art.

Pot moderately firm, because the Carnation is a fine-rooted plant, and requires it. But this, again, is a point for the operator to decide

personally, and he must be guided by the amount of moisture in the soil. Having it too wet or too dry is a great mistake, and is one which may cost the life of the cuttings. Great care must be exercised not to get the cutting deeper in the soil than it was in the sand, or it will damp off. Endeavour to have the potting bench in the house where the cuttings were propagated, or else in a shed free from cold draughts.

The young plants are best stood on ashes, and given a little space between the pots. As yet we have not found a substitute for good light and air. It is these two elements which will do more to build up a hard, sturdy young plant than all the elaborate potting composts or overhead sprayings in the world.

### Watering Young Carnations.

The correct watering of plants in itself is quite simple, yet it is one of the most difficult arts for a beginner to learn. The secret is only discovered by observation. The expert knows by the very appearance of a plant whether it requires water or not, and also exactly how much it requires.

After a Carnation cutting has been potted, it should receive sufficient water to penetrate to the bottom of the pot. After that, water should be given only when the soil shows signs of getting dry.

It is advisable to damp the house down, also to spray the young plants overhead on very bright, drying days, but I am no disciple of this perpetual damping down and overhead

spraying. It only encourages a soft growth, and is not natural to the plant. If the young plants are saturated with water they will receive a check and remain stationary for several days. The watering should be about sufficient to reach the bottom of the pot in an hour's time after the operation.

### Shading Young Carnations.

One of the mistakes made with young Carnations is that, as a rule, they are shaded and generally coddled far too much. If the cuttings are hardened off before potting, and the freshly-potted stock receives sufficient water in the first place to reach the bottom of the pot, little, if any, shade is required after the first two or three days, and even then only from the strongest sun.

No sun rays should strike the freshly-potted Carnation cuttings for a few days after potting. The exact number of days will depend upon how well-rooted and matured they were at the time of potting. As long as they are inclined to wilt they must be shaded from strong sun, but the shading should be decreased as rapidly as possible.

The roots should have reached the sides of the pots in three to four days. Then remove all shading, except in spring, when the sun is particularly powerful, in which case shade for the few hottest hours during the day.

### Temperature for Young Carnations.

There is never anything gained by growing young Carnations in a high temperature. A

long-jointed, rapid growth is invariably the result. Comparatively few growers realise the great benefits to be derived from growing young Carnations in a low temperature. As soon as the newly-potted cuttings are sufficiently established to stand the full sun, they should be gradually accustomed to a lower temperature, say forty-five to fifty degrees during the day, and forty to forty-five degrees at night, with as much air as possible.

This treatment not only encourages a slow, steady growth, but induces a partial rest, just the same as we enjoy after undergoing an operation, no matter how slight; to say nothing of the check cool treatment has upon insect pests. A sturdy-grown young plant, with practically no spaces between the leaves, can only be obtained by cool, light, airy conditions.

### Young Carnations Becoming Hard.

Young Carnations will stand a long time in small pots without apparently suffering, but in reality they do suffer just the same, for the roots not only become pot-bound, and thus checked, but the stem of the young plant becomes hide bound, and when potted will not commence growing quickly, or when stopped do they produce so many breaks. There is one thing which must always be kept in mind, viz., never allow young Carnations to become hard.

### Potting-on.

As soon as the cutting becomes established in the 2-in. pot, pot on into a 3-in. size. Do

**Fig. 6.**

The ball of a young plant in a small pot. The roots have become checked for want of potting.

**Fig. 7.**

The ball of a young plant in a small pot. The roots are in a prime condition for potting on.

A young Carnation in a 2-in. pot, fit for potting-on.

A young Carnation in a 2-in. pot, which is practically spoilt for want of potting

not allow the roots to become weak or slow in action for lack of nourishment (see Fig. 6), but pot on before this takes place (see Fig. 7). Some growers use a 4½-in. pot for the next move, and in the event of dull weather, there is a large quantity of soil lying round the small ball of the 2-in. pot unused. This would quickly become sour, particularly if at all wet. Besides this, the plant does not need all this quantity of soil at once in its young state. The one aim should be to succeed in growing a perfect plant, and no extra trouble or expense should stand in the way. Hence, build up a strong, stiff, short-jointed, robust young plant, by giving it small but frequent moves into a larger pot each time. The compost for this move from the 2-in. to the 3-in. pot should be four parts good maiden loam (if the soil is a little poor, add a small quantity of some specially prepared Carnation fertiliser), one part old manure, one part hard wood ashes, and sand. If the soil is devoid of lime, add a little old mortar rubble. In this matter the grower must be guided by the time of the year, and the sort of loam he is using.

To have more sand than is absolutely necessary means to weaken the growth of the young plant, while, on the other hand, to have insufficient sand and the soil too heavy is to impede its growth. Pass the compost through a quarter-inch sieve, otherwise the lumps will cause cavities between the pot and ball of the young plants.

Have the pots perfectly clean. There is no occasion to crock them. It is becoming old-

fashioned to do this with small pots, as the crocks take up soil room. The hole at the bottom should give ample drainage if the pots are stood on ashes. In potting-on, the roots are liable to be injured in removing the crocks. Take great care not to allow more of the stem to be under the soil than was buried in the 2-in. pot. It being impossible to get the finger round the inside of the pot, give five or six sharp taps on the bench. This will get the fine soil well round the pot at an equal pressure. Care must be taken, previous to potting, to see that the plants are not dry, or they will receive a great check. On the other hand, it is quite possible to have them too wet, in which case we—who pot many thousands of one variety—always leave such until the end to get drier, but small lots of odd plants can be marked so as not to be watered for an extra day or so.

Some will think it waste of time and labour to put a young Carnation cutting into a 2-in. pot, with the knowledge that it will require to be potted into a 3-in. pot some two or three weeks later, but the difference between plants potted into small pots in winter in the first place, and those over-potted, is surprising.

So we will leave our young plant here in the 3-in. pot, those to be grown in the garden being now prepared for planting. The further potting-on is continued in Chapter IV. for those to be grown under glass.

Under no circumstances allow insect pests to gain a position. They invariably attack the partially-developed leaves, where they are ex-

tremely difficult to reach by fumgiation or syringing.

Some may say, does it pay to give all this attention to grow Carnations? The best always pays. It is not failures, but successes, which are recognised.

For instructions regarding stopping of the young plants the reader should refer to the latter part of Chapter IV.

## CHAPTER III.

### SOIL, COMPOST, AND POTTING.

THE marvellous possibilities resident in a single handful of soil is a consideration of no mean proportions. Its hidden powers, and the somewhat speculative results which we may or may not obtain from it, add to the glorious uncertainty of horticulture, for we are none of us dead to the pleasures of hope. Soil is not so much dirt, but a highly complex body. Far from being an inert, lifeless mass, it is most emphatically a thing of life, and must be treated as such.

A great deal also depends upon the grower who controls the food and water supply. It is important that he should endeavour thoroughly to understand the peculiarities of his particular soil, and learn how to get the best out of it.

#### Carnation Loam.

It is nothing short of marvellous, the good results which are obtained from the various soils of different textures and density, used in Carnation cultivation. That black, sandy, peaty soil is, perhaps, the absolutely worst

sample the grower of the Carnation has to contend with. It is by way of being heath soil, which will not even grow a high grade of weed. It lacks body, and cannot hold, for any length of time, any enriching addition if given it. Sandy soil, in the majority of cases, is low in plant food, and should be built up with other soils. The heavy clay soil is another extreme. It can be made to produce good Carnations. It must be harvested in dry weather, and only the surface, which has been subject to aeration and freezing, will possess any quantity of available plant food. It should be mixed with coarse sand and long manure to keep it open.

It is generally conceded by the best Carnation growers of this country that the ideal soil for Carnations is a silky, semi-sandy loam, one which feels smooth when rubbed between the fingers and thumb, sufficiently light in texture to afford free and ready drainage of any surplus moisture, yet with sufficient body to retain the available plant food. It should come from a well-drained locality, and possess an abundance of vegetable fibre. As a rule, such loam is light-brown in colour, and invariably is very evenly balanced in the essentials of plant life, and hence will not require to be greatly enriched.

### Harvesting Loam.

As we have said, the best soil is procured from high-lying ground, where there is a free drainage. That from low-lying, swampy land is inclined to be sour, while that from the top

of a hill, as a rule, is not rich. The soil between these two extremes is to be preferred.

The one idea in preparing turf is to have the vegetable fibre sufficiently decayed to be a food for the plant, and yet keep the soil open. Hence, if the fibre is too much decomposed, these advantages are lost.

### Yard Manure.

There is not any doubt that animal manure, besides imparting fertilising properties to the soil, is also of mechanical benefit, making the soil more porous and open.

For Carnations, manure, like loam, can be too old. If it will break up readily, it is in a fit condition to use. We always try to stack our manure, particularly cow manure, under cover, to protect it from the rain and avoid leakage.

The common rule, that horse manure with a good proportion of straw is the best for heavy soils, and cow and pig manures for those of a lighter texture, holds good.

### Sand.

The proportion of sand to be added depends entirely upon the texture of the soil, for while some will not require any additional, others will be greatly benefited by it, and, as we have already said, the best Carnation loam is of a medium sandy texture. One in ten is, perhaps, the extent to which it should be added to any soil.

It is essential that the sand should be of a sharp, coarse grain. We ourselves have discovered a coarse grade of sea sand, with portions of small rocks and shell in its make-up, which we consider almost perfect, and certainly Carnations do appreciate its good qualities.

### Wood Ashes.

Some advocate the addition of these, particularly in the case of very heavy soils. We, however, have not seen much benefit from them, considering the expense involved, except that they materially improve the mechanical condition of the soil. In our own practice everything within reason which will burn and produce good ashes is burnt. These ashes are stored in a dry shed, and used with soil at the rate of one in ten. We consider it almost equivalent in its usefulness to wood ashes, and much cheaper.

### Lime.

Some soils are short of lime, which is a potent part in Carnation compost. This may be added in the form of mortar rubble, chalk, or as air-slacked lime at the time of final mixing. This should be added at the rate of one part to two-hundredth of the compost.

Lime is one of those parts which, as a rule, have an influence for good, and the majority of soils are benefited by the addition of lime. It is quite possible, however to add too much to the potting compost. This danger is over-

come by using chalk in place of lime, or preferably pulverised limestone.

### Potting Compost.

Owing to the various grades of soil, it is impossible to give exactly the best compost for Carnations, because circumstances alter cases, but as a general rule, on an ordinary sample of soil, the following mixtures will be found the best. A point which must never be overlooked is that the best soil can be spoilt if it is interfered with in wet weather.

Some growers add bonemeal to all their mixtures of soil, but if, when established, the Carnations are manured with an evenly-balanced Carnation food, it will be found cheaper and better not to add this ingredient. It is not the most elaborate recipe which makes the best dish, nor is it the most elaborate compost which grows the best Carnation.

The compost for the first potting of rooted cuttings should be: Five-sixths loam, one-twelfth sand, one twenty-fourth wood ashes and mortar rubble.

The compost for the second potting for plants from the 2-in. pot into the 3-in. pot, or those of similar sizes, should consist of five-sixths loam, one-twelfth sand, one twenty-fourth manure and wood ashes.

The compost for all succeeding pottings should be: Four-sixths loam, one-sixth manure, one-twelfth wood ashes, one-twelfth mortar rubble, and sand added according to the texture of the soil. A quarter of a pound of Carnation

food to a barrow-load of compost can also be added.

### Potting.

One the most important points in potting is to have everything ready—potting bench firm, soil in the correct degree of moisture, pots close at hand.

Every pot should be filled in just the same way, leaving the same amount of space for the water, and if the soil in each pot is firmed to the same degree, the plants will dry out evenly and grow regularly.

In potting a plant from the 2-in. pot into a 3-in. one, again we do not crock, because so small a pot is stood upon an ash bottom, and therefore it has sufficient drainage. The plants are knocked out of the 2-in. pot, care being taken that none is in the least dry at the roots. A little soil is placed at the bottom of the 3-in. pot, so that the top of the plant to be potted, when stood in position in the centre of the 3-in. pot, is level with the top of the pot. The spaces at the sides are filled with the fine potting compost, and some piled on the top. The ball of the 2-in. plant is firmed into the soil, using the first finger and thumb of each hand. The pot is given three sharp taps on the bench, and the plant is potted. There will be about a quarter of an inch space left for watering, and the surface soil will be quite loose.

In potting a 3-in. plant into a 5-in. pot, the larger pot should be well rubbed down with a dry cloth, also well crocked—that is, a piece of

broken pot of sufficient size almost to cover the bottom of the pot should be placed over the hole at the bottom, and a few small pieces placed round it. The actual process of potting is very similar to that of the 3-in. pot, except that there is a larger space for soil between the ball of the 3-in. plant and the 5-in. pot, so that when this has been filled with soil, it is essential that the pot is given a sharp tap upon the bench to shake the soil down. Afterwards, the thumb of each hand should be run round the side of the pot, to firm down the bottom soil a little, and make sure that no lumps are holding up the soil and causing a cavity. The pot should then be filled up to the rim with soil again, and be given several sharp taps upon the bench, and the plant is potted. Some recommend the use of a stick or rammer to firm the soil round the sides, but the whole soil is firmed much more evenly by sharp taps upon the bench.

In potting a 5-in. plant into a 7-in. pot, the crocking, potting, etc., is the same, except that it is essential to use a rammer to firm the soil round the sides of the 5-in. plant when placed in position; but we do the bulk of the firming of the soil by tapping the pot on the bench.

In potting into larger pots than the 7-in., the bulk of the firming has to be done with a rammer, because it is impossible to tap large pots on the bench to firm the soil; but an excess of ramming compresses the soil too much, particularly towards the top of the pot, where the soil should be left loose, this being gradually firmed down by the watering.

The actual amount of firming to be done greatly depends upon the texture of the soil. In the case of a light, sandy soil, it is difficult to get it too firm.

If crocking is done at all it must be done carefully and well, particularly in the case of large pots. No dirty pots should ever be used.

A golden rule in potting is never to use soil that adheres to the operator's hands. It will be too wet, and the plants will not grow away freely in it.

### Garden Soil for Carnations.

In the case of very light, sandy soil, which as a rule is poor and lacks plant food, autumn or very early Spring planting is almost a necessity. The advantage of light soil is that the plants have a free drainage during the winter, and commence to grow earlier in the spring. A heavy dusting of pulverised limestone dug into light soil gives it substance. A top-dressing of Carnation food given from April to September, also hoeing the surface of the soil once each week in bright, dry weather, will help the roots to keep cool and moist, and also assist the Carnation food (which should be organic, and not chemical) to perform its work, and better results are obtained from repeated top-dressings and hoeing than from digging in large quantities of yard manure.

### Heavy Clay Soil.

The soil at our Wivelsfield Nurseries is heavy clay, but at our Plumpton Nurseries it is medium loam, which is ideal, yet at the Clayton

Nurseries it is light and sandy, and it is difficult to say where the best Carnations are grown. Our new Carnations are raised and reared at our Wivelsfield Nurseries. Clay soil is best deeply dug or bastard-trenched in the early autumn, and left as rough as possible, so that the winter frosts can pulverise it, while a dusting of lime will help to break the soil down. Old yard manure or other enriching medium is best added when the surface of the soil is lightly forked, or Canterbury-hoed over, in the spring. In heavy soil all seasons are favourable for planting, with the exception of late autumn and winter.

### Town Garden Soil.

The soil in an old town garden is often sour, and infested with earth worms, through lack of cultivation. This soil simply wants correct treatment to make it ideal for Carnations. A dusting of lime is the most valuable addition. Use just sufficient to look like a light snowstorm, then deeply dig the soil, leaving it in big lumps, and as rough as possible, so that the light, air, and sun can sweeten it, when it should be left for a few weeks. This soil is best enriched during the spring and summer with Allwood's Carnation food, hoeing the surface of the soil during bright, dry weather, being of the greatest possible assistance to the plants.

### Leafmould.

In our opinion leafmould is most harmful in the cultivation of Carnations, either in pots or in the open garden.

## CHAPTER IV.

### SUMMER TREATMENT OF PERPETUAL-FLOWERING, PERPETUAL MALMAISON, AND PERPETUAL BORDER CARNATIONS IN POTS.

IN the previous chapters we have followed the cultivation of the young Carnation from a cutting to the 3-in. pot.

It all depends upon the time and season of the year as to where the young plant can be grown, and also upon the latitude. At Hayward's Heath we grow our young plants, intended for flowering under glass in pots the following winter, on in frames from the middle of April. All our frames are covered with thick mats upon cold nights.

The degree of frost a young Carnation can stand without serious harm is doubtful. It is certainly several degrees, but such frost must have some ill-effect upon the development of the unhardened plant, hence we never allow our young stock to have a lower temperature than forty-five degrees before May, when the growth is well matured by the sun and air during bright days, and will take little harm. We, however, make it a rule always to grow

our young Carnations under glass, whether it is in a house or under frame lights, until they are potted on into 5-in. pots, and even then it is only upon rare occasions, and with hardy-growing varieties, that they are grown in frames without glass over them, because until early May we are not sure of our weather, and heavy cold rains do irretrievable harm to plants growing in pots. Of course, in the North of England, where the spring season is quite a fortnight later, allowance must be made.

The difficulty for the reader at this juncture is the exact position of the young plant. The young plants grow much more quickly as the season advances. Thus a cutting inserted in the sand on December 1st would be rooted fit for potting into the 2-in. pot by January 1st, and for the 3-in. pot by February 1st, when in turn it should be potted on into a 5-in. pot in early March. Now a cutting inserted in January and rooted in early February would grow much quicker, owing to the advance of the season, and be ready for potting-on into the 5-in. pot almost at the same time as the December-rooted cutting, whilst a cutting inserted in March will root and grow much quicker still, and require potting on almost every fortnight. That is why it is impossible to give definite rules and an exact calendar of operations, as some would wish, with exceptions made for every dull or rainy day.

When the young plants have established themselves in the 3-in. pot, and before there is any tendency for them to become pot bound, they should be potted on into 5-in. pots, the

latter size for general pot culture in the case of good, free-growing, strong varieties. The compost for potting is fully dealt with in Chapter III.

The plants should be stood in a light, cool position, where an abundance of air can be given. A greenhouse in the early season, and a frame after the middle of April, are excellent.

There is full scope for the skill of the horticulturist in cultivating Carnations in pots during the summer—not that it is a difficult task, but the varying conditions require to be efficiently met. The cultivator who closely studies his plants will have them almost double the size in autumn, and get quite double the crop during the winter, compared with the indolent, careless grower.

Avoid having too fleshy a growth. Such is produced by a plant grown in too rich a soil, always moist at the root, and repeatedly sprayed overhead. Better results are obtained from plants treated with greater moderation, and in a more natural way, so that the growths do not suddenly change from soft, sappy shoots into case-hardened branches, but gradually mature and build up a woody growth. As we all know, in flowering plants it is well-ripened wood which produces good flowers, and in Carnations for winter flowers the plant must have good wood to produce good flowers.

Having the stock potted into its flowering pots at an early date is quite an important matter. A well-established plant in the autumn is the one which will withstand win-

ter's weakest light and continue to grow during the dull months. All Perpetual Carnations intended for early winter flowering under glass should be potted into their flowering pots by the end of June. The best position for them after the final potting is in a frame, with the exception of certain varieties, where they can be protected from heavy rains. Let the plants be treated generously in the matter of room, because that means ripened growth. The wind is of no assistance to the Carnation during the summer, and a position where its ravages are somewhat checked is to be preferred. What a contrast all this is to the old idea of growing Carnations in a frame and shading them from the sun.

The best size of pot for Carnations to flower in the first season is a matter of opinion, and depends greatly upon whether the cuttings were taken in December or February. Early cuttings will produce a heavier winter crop of bloom if flowered in 7-in. and 8-in. pots, and rarely, if ever, have we found it necessary to exceed that size. For March-rooted cuttings, 6-in. pots are large enough.

It should be clearly understood that late August or September potting does not pay. Mild feeding is to be preferred, provided a good, cool-acting fertiliser is used in moderation.

### Watering Carnations in Summer.

The natural season of growth for all members of the Dianthus family is the spring and summer, hence the supply of water after the plants

become well-established must be greater than in the dull season.

Since so much depends upon local conditions, texture of soil, etc., it is impossible to give any definite rules upon this matter. In fact, right through this book, I feel that the most I can hope to do is to convey to the reader an idea which by practice and observation will gradually reveal itself to him.

Then, when confronted with the real difficulty, he will know how to grapple with it.

The old notion that we are not following Nature's way in watering when the sun shines is without reason, for though the sun is obscure during a rainfall, everything is wet upon its reappearance after the passage of the storm, and everyone has noticed how the growth fairly jumps under those conditions.

Very wet and very dry soil cause the root action of a Carnation to stand stationary, and it is the varying degrees of moisture between the extremes which encourage and support a vigorous, healthy growth. A freshly-potted plant is readily spoilt if over-watered, owing to the fact that the large body of new soil does not dry out, hence it turns sour and spoils the plant.

Referring to overhead watering, as I have pointed out, this does not injure but assists the plant's growth if done in moderation, and if the natural glaucous, or bloom, upon the foliage of the Carnation, which is provided by Nature as a protective against fungoid diseases, is not destroyed. It is most important that the plants

should be syringed during the summer to keep insect pests in check.

### Watering Plants Out of Doors in Pots.

I always maintain that no one can tell another how to water a plant. He may be able to give you an idea, but that is all. As a general rule, if a Carnation is dry its pot requires filling up with water, if not dry, leave it. This perpetual sprinkling never grew anything but rubbish. If plants are looked over and watered just after the dew has dried off them, then well sprayed again in the late afternoon, that is all they require when the pots are not too full of roots. Some growers spray overhead at mid-day. This is of little importance; but a good evening spray will keep plants clean from insects, and be a power for good on warm summer nights. In the late summer or early autumn, if unable to house the stock, no spraying should be done, and watering should be carried out judiciously.

### Supporting Plants.

When the plants have had their second stopping and are established in their flowering pots with growth some three inches long they will require supporting.

There is no economy in leaving plants until some branches break before supporting them. A straight shoot invariably grows into a strong plant.

In growing Carnations for profit, the practice of supporting plants with sticks and raffia is

**Fig. 8.**

Plants supported with Allwoods' Patent Plant Supports

quite obsolete, simply because it does not properly support the plant, the stronger growths robbing the weak of their allotted space. To get the stems to grow erect much tying is required, so that the flowers are only cut with difficulty and waste of time. The one drawback of the Perpetual Carnation is the large amount of attention required in the form of tying, and in the spring of the year they are as bad as creepers in that respect.

The best cultivators are in favour of individual wire supports for each separate plant. These are made in varying styles, and each grower should select the one he thinks is the best. A well-supported plant is invariably a healthy plant, while a straight stem produces the finest flowers and a smaller percentage of split calyx. Although, of course, the first cost will naturally enter into consideration, it should be kept subordinate to the question of efficiency and labour-saving capacity.

A pot plant, supported with wire rings which fix to the stakes (Fig. 8) is allowed to grow in a perfectly natural way. When once fitted out in the summer it is right for the entire season. It is movable, cuttings are taken off easier, the plant is cleaned over in less time, and the amount of room can be increased as the plant grows. In the case of plants grown on the benches, the soil can be cultivated more easily.

### The Time to House Perpetual Carnations.

Time has changed our ideas about housing Perpetual Carnations. Few, if any, of us

leave our plants out, as of yore, until September, to be bathed in the heavy dews of autumn. Of course, there are still points in favour of late housing, and a Carnation house with insufficient ventilation is about the strongest of these, otherwise the first week in August had better see all plants housed away in their winter quarters.

I know how refreshing it is in the autumn to see the plants, when left out of doors, making a heavy growth with the increased dews. Too often these dews are looked upon as an assistance to the plants for winter flowering, but experience has proved that this is not so, but that it is simply an autumn growth, created by Nature to enable the plant to withstand the winter in a dormant state, and not to enable it to continue work, or, rather, grow and pay rent. If the plants are put in an airy house in August, the summer growth is continued, and the gradual acclimatising process is begun, so that there is no undue exciting of the growth, compared to the September housing, when the plants receive a greater change, and do not produce nearly so high a grade of flowers till the spring. In this matter, also, it is better that the buds should be formed under glass than out in the open, and that is why market growers commence to house early in August, whilst others greatly prefer to grow their entire stock under glass all the summer for early autumn blooms, because they come of better quality, earlier, and on better stems.

Some may think that I have lost count of the hot, early days in September, but with a

circulation of air and good light no ill-effect will take place if the thermometer does run up high during the day.

It is a mistaken idea that Perpetual Carnations require shading in the autumn. The few early blooms had much better be allowed to spoil than the plants weakened. The plants should be sprayed twice on bright days, and the houses damped down, but no moisture should be allowed to hang upon the foliage, or indeed in the house at all at night. It is almost essential to feed plants when they have grown particularly well, and have out-grown their pots in August, but we feed very lightly after mid-September and during the winter. A cool, evenly-balanced special Carnation fertiliser should be used. It is, perhaps, the best test of a fertiliser to see how it brings the plants through this difficult ordeal.

## Growing Perpetual Carnations the Second Year.

Many are undecided what to do with the plants after the first season of flowering. Speaking purely from a cut-flower point of view, the Perpetual Carnation will produce first-grade bloom for two consecutive seasons, and nearly all our best market growers carry their stock over the second season. Of course, the two-year-old stock has never quite the smart appearance of the younger plants, but for quantity of flower they are equal, and in the case of odd varieties, they are superior in point of bloom.

If the blooms have been cut with long stalks during the winter, so as to keep the plants reasonably short, little pruning is required. There is no gain in pruning back hard, because this will make them late in flowering. The breaks made from the very hard wood also will not produce such a high quality of flowers, while invariably the plants succumb to this harsh treatment. Plants which have been forced or improperly fed with unsuitable fertilisers are useless for growing on, and should be discarded.

Potting is the most important factor in growing plants on for the second year. This should be done as early as possible, June being quite the latest month for good results. A very large pot should be avoided. An advance, such as a 5-in. pot-grown plant into a 7-in. pot is a good shift; but if a plant from a larger size pot is potted on, as much as possible of the old soil should be removed, and a 10-in. pot is the limit to pot into. The plants will not be benefited by too much shading, but a light shade, with plenty of spraying on bright days, is best. This treatment for a week or ten days will see the plants commence to get away into a free growing state, and they may then be stood out in the open so as to repair their health and vigour for the ensuing winter, when the same treatment as advised for the younger plants should be given.

I do not say that plants during the second season are quite as good for propagating purposes as younger plants, but if correctly grown

and well cared for, they most certainly produce a tremendous crop of flowers.

### Summer Cultivation Under Glass.

The growing of Carnations under glass through the entire summer was first evolved by an American firm, who sent out Grace Battle—a variety so subject to the rust disease that a fresh system had to be adopted with it.

The chief advantage obtained by growing Carnations under glass all the summer is that far better blossoms are obtained from them during September, October, and November, than from those grown out of doors. It also prevents some varieties which are prone to fungoid diseases, from becoming affected. The plants themselves make a more wiry growth. In some varieties the entire crop of bloom is not quite so large, whereas with others it is improved.

Under any circumstances, however, it is useless to attempt to grow young Perpetual Carnations under glass in the greenhouse all the summer, unless they are given an abundance of air. It is also beneficial, if not essential, to have ash or similar stages, otherwise the plants dry out too rapidly, and become hard.

At Haywards Heath, also our Cut-flower Nurseries at Clayton, we give our plants a thorough spraying on bright days in the morning and early afternoon, thus keeping red spider, which is the greatest enemy under this

system of cultivation, in check. We also make a point of keeping the atmosphere moist during bright sunny weather, otherwise the plants have a tendency to become hard and make a weakened growth. Some growers shade the houses when Carnations are grown in them all the summer, but we have rarely found it necessary to do this with an adequate water supply and abundant ventilation.

It must be clearly understood that this system entails more labour; and frames, where the lights can be kept over the plants to shield them from cold, heavy rains, and also protect them upon cold nights, are advisable for amateurs and private gardeners.

### Stopping or Pinching Carnations.

Stopping Carnations, like many other duties in horticulture, sounds very difficult until it is understood, after which its necessity and simplicity is self evident. It closely resembles pruning Roses, it is not absolutely necessary, but the modern types have almost made it so.

It must be clearly understood that the old-fashioned Border Carnation and Pink should not be stopped, it is only the new improved forms, such as Perpetual-flowering Carnations, Perpetual Malmaisons, Perpetual Borders, and Dianthus Allwoodii which require it.

To stop a Carnation is simply to remove the top of the growth, so as to induce it to make side breaks, and so build up the plant, and

A. B.

The longest growths on each plant in a fit condition to receive their second stopping.

Fig. 9.

A cutting which has been potted on at the correct time, stopped at the sixth joint, and breaking at every eye.

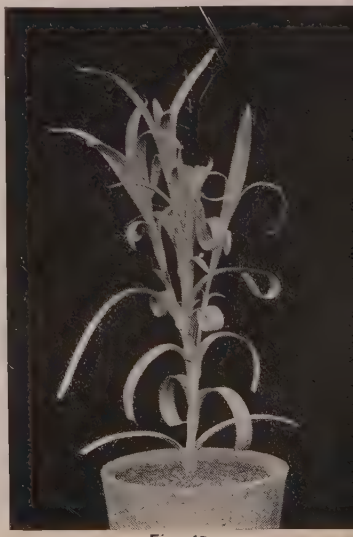


Fig. 10.

A cutting which has been checked in th small pot and turned hard or woody. Not the bare stem and few breaks at the top o the plant.

from four to six pairs of leaves should be left from the surface of the soil in the first stopping.

### The First Stopping.

Among the difficulties which confront the average grower are when to stop or pinch the top off the plants, the correct conditions in which to have the young plants for stopping, and where to stop them.

The object of the first stopping is to encourage side growth, and so build up a bushy plant, which in turn will produce a large quantity of flowers. Naturally, the more growth that is obtained the larger the cut of flowers will be. If, on the other hand, the young plant is not stopped it will simply produce a single small flower, and break naturally, making a long straggly plant.

It is a matter of vital importance that the young plants should be in a vigorous, healthy condition when stopped, and this state can only be promoted and maintained by a free root action (Fig. 9). If it receives a check for want of potting or planting, the growth becomes too woody and hard, so that instead of making some four to six strong breaks, only two or three are produced at the top of the plant (Fig. 10). These are fed through a hard stem, which naturally means an impeded or reduced food supply.

Again, if the young plant has been shaded, or grown in a poor light, the growth will be too soft and sappy, and this, in turn, will not produce the full crop of breaks; whilst a plant

which has received a reasonable amont of care and attention, being grown in an airy position, with full sunlight, and potted as required, will have a matured growth, which will break at every eye, thus laying the foundation of a good plant.

Some good growers make it a rule never to stop any young plants after October or before February, claiming to procure more and better breaks by so doing, and there is certainly a lot of wisdom in this.

Regarding the actual stopping itself, there is only one correct way of doing it, and that is to break the lead out with a sideward bend. This is best done in the early morning, when the growth is stiff and brittle. Let me not be misunderstood. I do not mean just to break or pull out the joint of the growth, but to remove the entire top of the plant with a set of developed leaves intact, so that the remaining eyes are in an equal state of maturity, and all break evenly, and thus we commence with an evenly-balanced plant.

Some growers advocate using the knife for removing the tops, but, personally, I have always found the growth snap off readily; yet, sooner than pinch and bruise them off with the thumb and finger I should most certainly use a knife.

The question of stopping is fairly simple in the first stage, namely, when the tops are pinched off the young plants, as a general rule, at the sixth joint. But when the side-breaks or growth require stopping, the difficulty arises,

because the fact is very patent that if we stop all the growths of a variety at the same time, they will all flower at the same time. Carnations can be made perpetual-flowering by a close study of the varieties in this question of stopping.

Here are two golden rules which apply to all varieties: Make stopping a duty, and try to do it systematically; and do not stop too soon by pulling out the centre of the growth, as this will cause a number of weak growths.

### Second Stopping.

There is a three-fold object in stopping Carnations and Allwoodii during the spring and summer. Stated briefly, it is to encourage continuity in blooming, to preserve and build up the plant's energy, and to obtain a shapely plant.

There is no wisdom in allowing plants to make an unnecessary lot of top growth, and then to go to them one morning and make a wholesale slaughter. This is simply wasting their energy, and causing a check, and it also encourages the plants to crop all at once, instead of producing a continuous supply of bloom during the entire year. It is only natural that if the growths of a variety are all stopped at one time they will flower together. The object should be to go over the plants, say, twice a week, just stopping what growths are in a fit and proper condition to be so treated.

If plants are out in the open it is never wise to stop them during dull, rainy periods, as the

growths are very much softer and more sappy, and do not break so evenly, or produce so many breaks. It also causes a greater check to the plants.

There is one rule which it behoves all Carnation growers to have deeply impressed on their memory. If the growth is long enough to be stopped, break off the top—if not, leave it. It may be asked, when is a growth of sufficient length to be stopped? I say, as a general rule, when one can remove two developed leaves, and leave four to six good joints or sets of leaves on the branch. But with the long, loose-growing varieties, it is best to pinch the growth in a little harder.

I hope I have made myself explicit. After the young plant has received its first stopping it produces side growths, which, as a general rule, should be treated as stated by stopping them as they become long enough, *i.e.*, when you can leave from four to six pairs of leaves. Never stop more than one growth on a plant at the same time, because it is bad for the plant when so stopped. It is better also that it should not have the strain of bearing more than one fully-developed flower at the same time, while it is not necessary to stop all the growths a second time.

Now we come to the crux of the whole subject, viz., when to cease stopping, so as to obtain the best results. The modern Carnation is perpetually flowering because it is perpetually growing, but, naturally, the winter growth is much slower than the summer growth, and if it is stopped too late in the summer it

will have too much to do in the autumn to produce bloom by the winter. On the other hand, if it is not stopped sufficiently late it will produce a quantity of blooms in the autumn, when they are not so highly prized. As a general rule, late June is sufficiently late to stop the average variety of Perpetual Carnation for winter bloom. The best guide to remember is that the actual growth stopped will not produce flowers until some three to five months later.

### Stopping Perpetual Borders and Allwoodii for Flowering in the Garden.

What I have previously written applies to the first stopping, whether the young plants are growing in pots under glass or in the open, also we always stop our Perpetual Borders and Allwoodii the second time, because we find it better to build up a good bushy plant before permitting it to flower. Of course, it is not necessary to stop all the growths for the second time, but at least some of them should be.

## CHAPTER V.

### PERPETUAL-FLOWERING CARNATIONS, PERPETUAL MALMAISON, AND PERPETUAL BORDERS UNDER GLASS IN WINTER.

IT is in the dull, dark days of winter that the grower of Perpetual Carnations fully appreciates the beauty of his plants blooming under glass. He forgets the dormant, sleeping vegetation outside, for it is perpetual spring with the divine flower.

In the winter we expect dull days, and, naturally, in the case of any winter-flowering plant, this proves to be the most trying period. Increased heat without increased light is detrimental. During these dull spells the flowers open slowly, and some varieties come a little untrue in colour, particularly those with magenta in their make-up. Under such conditions, as much fresh air as the temperature will allow will keep the growth robust, and the flowers true in colour.

#### Watering in Winter.

Watering in winter requires close attention, because the fire heat rapidly dries out the soil in the pot. Otherwise the plants would require

AN AMATEUR'S CARNATION HOUSE.

but little water. During the winter a Carnation will stand being kept fairly dry much better than too wet, provided that the drying process does not extend to such a degree that the feeding roots of the plants are injured. There are more growers of Carnations who imagine that they know all there is to be known about watering than there are those who possess the actual knowledge. An observant grower, however, can, by close observation and the application of common-sense, quickly become proficient in this art. The simple rule to "water according to the weather and season of the year," is only learnt by few; these are the successful growers. "If a plant is dry, water it: if not, leave it alone," is yet another horticultural rule on the same subject. These varying conditions of moisture are only learnt by close observation, but to go round giving this plant a teaspoonful, and that a teaspoonful, because it may be dry to-morrow, is setting about the work in the wrong way.

Everything depends upon the climatic conditions and season of the year. Carnation plants, if growing vigorously and blooming profusely, require considerable water in winter, whereas, on the other hand, plants which were overpotted or potted too late, or in unsuitable soil, and hence are suffering from a weakened root action, do not require much water. It is judging between these two extremes wherein the secret lies.

No Carnation plant should be kept perpetually wet or perpetually dry. It is the craftsman who can discriminate between the correct

degrees of drought and moisture who appreciates the root action of the plant, and the means by which it grows. Excessive moisture not only enfeebles the root action but invariably turns the soil sour and useless; while excessive drought checks the root action, so that the plant is unable properly to absorb moisture when given.

During the dull season of the year great care has, naturally, to be exercised, and the selection of suitable days studied. No plant ever wanted more water simply because it was Saturday, and the waterer was doing Sunday duty. To water heavily upon dull, rainy days is useless, simply because no evaporation is in progress through the leaves. Few of us realise that one-third of the moisture absorbed by a Carnation transpires through the leaves, and does not actually go to build up the growth.

Towards the spring of the year, after a dull spell, the growth of the plants may become so soft that they flag on the first bright day. In the eyes of the inexperienced grower, this may be taken as an indication of dryness, and a heavy watering is given before the plant requires it.

But rules for watering plants must always be elastic and adaptable, as soil conditions vary so greatly that some require double the amount of water to others.

### Disbudding.

Disbudding in the case of all Perpetual Carnations is a prime necessity, because it requires almost as much effort on the part of the

plant to produce three blooms on one stem as it does to produce three blooms on three separate stems. It is not the stem, but the flower, which takes the vitality out of the plant. We can all remember how, a few years ago, when the great beauty of a perfect Carnation was not appreciated to the extent that it is to-day, the practice of removing the crown bud, and allowing several of the lateral buds to develop, was quite common. Many market growers used to serve their plants this way, and sent quite short-stemmed blooms to market. At the present time, such blooms would be almost an unsaleable commodity.

Too often the novice or over-anxious gardener, in his endeavour to procure very large flowers, errs on the severe, rather than on the lenient side in disbudding. He removes the lateral buds as soon as they become visible, injuring the main stem and leaves in his over-eagerness. To remove the buds at the base of the stem thus early would perhaps do little harm; but those at the top, close to the crown bud, should be allowed to become an easy size to handle before removal. On the other hand, if the lateral buds are allowed to remain until they become almost fully developed, more plant tissue must be wasted, and a proportionate amount of energy also, thus defeating the object in view. This does not help, but rather checks the developing of the crown bud into the large, perfect specimen so much desired.

It is a common practice in commercial establishments in the autumn, when the Perpetual Carnation naturally makes a short stem, also to

remove one or two of the stem growths. This not only gives a longer stem to the flower, but helps to keep the plant's growth short and compact.

### Heat in Winter.

The ideal "fresh-airy" conditions in a Perpetual-flowering Carnation house in winter are best promoted by having fire heat and ventilation on the house. The exact amount of each is governed by the climatic conditions prevailing at the time, so as to maintain the required temperature with a buoyancy in the air.

There is no sense in closing the ventilators in the early afternoon, with the idea of shutting in the heat and driving the temperature very high, in order to save fuel, because it will only last for a short time, after which the plants will become chilled.

Sometimes in the autumn we get mild, damp weather, when one would imagine that artificial heat was unnecessary, but just sufficient heat to dry up the atmosphere in the house is required.

While the Carnation is more tolerant of cold than it is of excessive heat, there is no reason why the plant should suffer from either.

The correct temperature for Carnations must be governed, to a large degree, by the strength of light, more particularly in the case of artificial heat. Air also has a powerful bearing on the subject. We all know that a Carnation house can run up to 90 degrees in the summer with sun heat without any ill-effect, provided

there is a circulation of air; whereas if this heat be reached by artificial means, with an equal amount of air, the plants will be materially weakened, simply because the increased heat was not counteracted by an increased light. The absolute necessity of a strong, direct light in growing Perpetual Carnations is a factor which should never be lost sight of.

As far as possible, a Carnation house should always have air upon it, and when fire heat is being used in dull weather, this becomes most essential, in order to promote a circulation of air. That is why the chief Carnation growers in England build large, light, lofty houses, so that in very severe weather a large body of air is retained, and if little or no ventilation is on the house there still is a buoyancy in the atmosphere.

I believe that, under ideal conditions, the best Carnations and the healthiest growths are procured by a night temperature of fifty degrees. Too low a night temperature will cause a standstill, which is harmful. When the light becomes stronger, as the day lengthens, more heat is also wanted; that is why we have a higher day temperature, which should be regulated in proportion to the strength of the light.

In growing Carnations there is scope for adapting oneself to circumstances and the prevailing condition of things. For instance, if the house is a light, airy structure, then a night temperature of from forty-five to fifty degrees is right, with a day temperature ten degrees higher; but if the house has heavy

rafters, and is old-fashioned, ill-ventilated, or in a bad position (all of which means a poor light), then the house must be run at a lower temperature to counteract it, so we will say forty to forty-five degrees at night, with a day temperature of fifty to fifty-five degrees.

Air to Carnations is essential. This applies to the night just as much as the day, but at all times avoid draughts. On mild nights run a moderate amount of artificial heat, with sufficient top air to get the required night temperature, thus creating a fresh buoyancy in the air.

### Soft Growth in Winter.

Sometimes we see a house of Carnations in January or February looking in a very bad condition. The flowers have weak stems, and hang their heads, while the growth is of a light colour from bad ventilation, caused during the dull weather by too much heat, or water, or insufficient light, whilst overhead spraying during dull weather would also have a similar effect.

To overcome this difficulty it is essential to keep the temperature of the house moderately low, giving as much air as is reasonable, while the plants should be held a little on the dry side. Nothing to prevent a good, direct light should be encouraged.

### Split Calyx in Winter.

The two chief causes of this fault are sudden changes in the temperature, and lack of sun-

shine. The first can be avoided by close attention to the ventilators and boilers. It sometimes happens that on the cold yet occasionally bright days of mid-winter, when we are tempted to have the fires too low, the temperature drops too suddenly when the sun leaves the glass. Too high a temperature can be avoided by judicious ventilation.

The second cause can be counteracted by cool treatment and ventilation, which is consistent with a strong, healthy growth. The selection of cuttings for propagating is also important. Avoid plants which split their calyx, as I believe that, to a certain degree, this is hereditary. The use of a too quick acting fertiliser will also cause the calyx to split.

### Shade Carnations Under Glass.

Whilst shading of the flowering stock is essential, it is very easy to shade too heavily, and also too early in the year, because the plants make what might be termed a spring growth. This is of a very rank nature, and unless the plants have strong sunlight, it becomes very soft, and devoid of the necessary tissue. The plants suffer as the season advances and the sun's power increases, producing an inferior growth of bloom.

April, as a rule, is quite early enough to commence shading the flowering plants, and then it should be put on quite thinly, because there will be days when we wish we had none, while, as the season advances, the flowering plants benefit by it being a little heavier.

It has been conclusively proved by experiments carried out in England that certain plants, such as Roses, when grown under glass, benefit by a slight shade or reduced light in summer, and it is said that one-sixth of the light on a bright summer's day is sufficient for the needs of the plants, and not until the light is reduced to about one-twelfth do they begin to suffer. This is almost proved by a few cloudy days in mid-summer—how they will improve the appearance of the plants under glass; but this only applies to very bright summer weather.

Those who have read the foregoing may perhaps think that there is very little to guide them as to every-day duties during the winter, and, of course, it is purely a question of conditions, which, while they do not exactly make Carnations, go a very long way to shape them. It is conditions which we have control over, and that control is purely gained by experience.

## CHAPER VI.

### CARNATIONS IN THE COLD GREENHOUSE.

IT is, to say the least, unfortunate that while so much has been written and spoken in favour of the Carnation during recent years, seldom if ever are their many merits for cold greenhouse cultivation extolled. It can be said, without fear of contradiction, that few if any plants are more adaptable, providing the simple rule of having a circulation of air in the house at all times is followed.

Under cold conditions all classes of Carnations will live neighbourly together, but undoubtedly the Perpetual Border Carnation is the best section to cultivate in a cold greenhouse, because its natural tendency is to lay semi-dormant during the winter, when growth in a cold greenhouse cannot be satisfactory, while its growth is very active at all other seasons.

The Perpetual-flowering Carnation is also most excellent for the cold greenhouse, particularly so when the slight knowledge of stopping the young plants to regulate their season of flowering is understood. For instance, for autumn flowers no stopping should be done after mid-June. But, to defer

flowering until the spring, stopping should be carried on until August.

Border Carnations and Allwoodii in the cold greenhouse are dealt with in other chapters, but it will be understood that all members of the Dianthus family can be cultivated under this system when the method of cultivation is adopted to prevailing conditions.

### The Greenhouse.

It will be readily recognised that in many greenhouses where Perpetual-flowering Carnations have not been flowered during the winter with success, owing to lack of light, the same greenhouse used unheated for Carnations can be made to produce most excellent results, simply because in the former case you encourage winter growth, and in the latter discourage it.

However, do not let me be misunderstood, all members of the Dianthus family must have a direct light to produce the best results, but, of course, where the light is weak the winter is the critical period, and what growth is made during that time would also be weak. Any greenhouse that has not a Northern aspect or is shaded by trees or buildings is suitable.

### Ventilation.

This is perhaps the most important factor, because if the greenhouse is not adequately ventilated at times it would become too hot, forcing and naturally weakening the growth of the plants; furthermore, as the autumn advances the growth of the plants must be hardened or

matured, so as to withstand the severest frosts of winter without injury, in fact it is not frost nor excessive cold which will injure them, but a close, damp cold atmosphere.

The ideal cold greenhouse should have ventilators on both top and sides, and have a box or other small ventilators just above the ground which should never be closed, also the top ventilators should never be closed; these should be partly open on the quiet side (the side opposite to that which the wind is blowing), while on hot, still days or nights all ventilators should be fully opened, and it is the adjustment of ventilation between these two extremes that require judgment and skill, which cannot be learnt from books, but only by personal observation and judgment.

### Watering.

Here again no writer can give precise guidance as to watering, because this depends upon the climatic conditions and season of the year, but no Carnations should be kept excessively wet or excessively dry, whilst naturally, in their growing seasons, during the spring and summer, they require much more water than when resting; in fact, if a Carnation is allowed to become very dry at the root when in active growth it causes a check; while, on the other hand, to keep a plant perpetually wet during the winter when its growth is semi-dormant may cause the roots to become unhealthy; when a plant is dry it should have sufficient water to saturate all the ball of soil, while the hole at the bottom of the pot will drain away all surplus moisture,

but to keep the soil sweet and roots healthy the soil should be sufficiently dry to require water before it is given.

### Potting.

It is difficult when writing a chapter such as this dealing with various classes of Carnations to go into details, it is only possible to give general rules, because the size and price of this hand-book forbids lengthening explanations and exact details; while potting and mixtures of soils is fully dealt with in Chapter III. All Carnations enjoy the same soils, while the cultivation of Perpetual Border Carnations is identical when grown in pots, and similar to the Border Carnation or Allwoodii when planted out of doors.

This is a general rule for all Carnations and Allwoodii, in fact all Dianthus grown in a cold greenhouse. They should be potted into a size larger pot in the early spring just before they commence active growth, and in the case of old plants it is best to remove a good proportion of the old soil at the top of the ball and the crocks, also the mat of fine roots at the bottom and sides, this encourages new vigorous young roots, while the slight check is more than compensated for.

A strong healthy Carnation should be potted into an 8 in. or 9 in. pot for the second year, and it will have exhausted its strength and completed its sphere of usefulness after this time, in fact we always consider that cuttings are more vigorous when taken from plants the first year than the second, and as a rule they

produce the finest flowers during the first year, although certain varieties are more productive in their second season.

### Propagation.

Broadly speaking, the best times to take cuttings is during September, also during March and April, but I do not propose to deal with propagation by means of cuttings here, because this is very fully dealt with in Chapter I.

Another excellent method of propagation is by layering during the early summer. This method can be very successfully employed by those who grow Carnations in their cold greenhouse, particularly the Perpetual-flowering and Perpetual Border types. The simplest method is to make a bed of light sandy soil two or three inches deep in a frame or protected position, take the plants of which you intend to layer the growth, preferably a large plant one or two years old, knock it out of its pot burying the ball, but have the top laying over the prepared bed, then layer each growth or cutting in the same manner as described for Border Carnations, except that you only remove what leaves are necessary to expedite rooting. If possible a frame light should be stood over the layers, also they should be shaded from strong sun, but this is not necessary, however, it is most important that they are kept wet and rosed overhead in bright sunny weather.

When the layers are rooted they should be severed from the parent plant, and a week or so afterwards potted into 3-in. pots. When they

are well established the tops of the young plants should be broken off at about four inches from the surface of the soil, which will be at the fifth or sixth pair of leaves. That is one of the differences between a Perpetual Border and a Border Carnation, layers of the former require stopping, but the latter do not.

From this stage the young plants can be grown on with the established plants, and should be potted on as required, but no potting is advisable after October.

I do not propose in this chapter to deal with growing young Perpetual-flowering and Perpetual Border Carnations during the summer for housing in August for autumn, winter and spring flowering, because it is dealt with in other chapters. The common practice is to procure young plants from the specialists in April or May in 3½-in. pots, these should be potted and grown on; the other method is to procure large plants in September in 6-in. pots in bud.

## CHAPTER VII.

### BORDER CARNATIONS.

I FEEL that it is within the scope of this book to give a digest of the cultivation of the Border Carnation. This, as is generally known, is the old original race of Carnations, and has been cultivated in our gardens ever since we became a nation, and but few of our present-day gardens do not possess specimens of them.

It is a distinct race of Carnations which bloom once during each summer, the flowers are perfect in form, in fact few species of plants are so highly developed. They are grouped purely for exhibition purposes under various classifications such as Picotees, Flakes, Bizarres, Fancies, Yellow Grounds, Selfs, etc. Certain varieties have been developed more for exhibition purposes than for garden decoration, and have a weak constitution which is a great mistake, because a Border Carnation should be a hardy, easy-growing plant.

#### Position to Grow.

The cultivation is very simple providing two essentials are observed. The plants must have

a direct light and not be overshadowed by trees, also the soil they are to grow in must not be sour through lack of drainage or bad cultivation; in the latter case drainage should be made by trenching or by raising the beds, and the soil is best sweetened by dusting it with lime before digging.

### When to Plant.

For almost a generation it has been a debatable point which is the best season of the year to plant the young stock out of doors. We have no hesitation in saying that in suitable soil and in the case of hardy varieties autumn planting is to be preferred. In the case of spring planting, March and April are the best months, planting later than this is rarely a complete success in the case of Border Carnations.

### How to Plant.

Never plant the young stock deep but only sufficiently so to hold it firm in the ground, nine inches between the plants is the minimum distance to plant, while fifteen inches is not too much space to allow between strong, vigorous young plants, whilst those intended to be left in the same position for two or more years should be planted eighteen inches apart, firm planting being most essential.

### Attending During Winter.

During the winter a Border Carnation planted out of doors should not be protected by

mounding soil around it or mulching with litter the same as Roses are sometimes protected, because it causes the lower leaves to decay, they are best left exposed to the wind and air which keeps the foliage dry and hardy. Hard frosts have a tendency to loosen the young plants in the soil, so that these should have the soil firmed around their roots after a severe spell. In an exposed position it is a good plan to tie each layer after planting to a neat little stake, this prevents the plant from being swayed about by the heavy winds.

### Attention During Spring.

The Border Carnation is one of the first plants to herald the advent of spring; full advantage should be taken of this. On the first dry spell the soil should be lightly hoed so as to break the crust caused by the winter rains which exclude the air, also a light dressing of Allwood's Carnation Food should be sprinkled on the surface of the soil to be washed in by the next shower, and this process should be followed each fourth week; but it is impossible to hoe the surface of the soil too often during the growing season, the one danger to beware of is injuring the roots by hoeing too deeply.

In March a 2 ft. or 2½ ft. cane should be placed to each plant and tied just above the surface of the soil, and as the main growth elongates for flower it should be secured to the stake with a wire-ring tie, as there is considerable danger of the tender young growth

being broken by the wind, the ring-ties are much better than tying with raffia or string, because they hold the growth loosely and are carried up the sticks as the plant grows.

### Attention to Border Carnations During the Summer.

During the summer months repeated hoeing and feeding is necessary, and it must be remembered that any fertiliser is not beneficial, but many chemical fertilisers are most harmful, undermining the constitution of the plant and ruining the stock; all Carnations must have a specially compounded, slow-acting organic food, and a dressing of not less than once a month should be given during the growing season.

To obtain the best blooms disbudding is necessary, the common practice is to remove the side buds round the centre crown bud, which is the best individual bloom, but the lower side buds if left develop into good flowers and open later.

The side growth or layers produced at the lower part of the plant grow rapidly during the late spring and early summer, in the case of some varieties it is necessary to support these with an Allwood's Patent Plant Support to protect them against strong winds and particularly so in the case of plants to be grown for the second year without layering.

It must be borne in mind that Border Carnations must not have their growths stopped, as in the case of Perpetual Carnations, other-

wise they will not flower during the succeeding year.

### Layering.

Layering is the only satisfactory method of propagating Border Carnations, plants propagated by means of cuttings are rarely satisfactory.

July is the best month for layering, although it can be done earlier, also as late as September layering can be done while the plants are in flower providing the layers are sufficiently developed.

It is necessary to have a small, sharp-pointed knife and layering pins made of galvanised wire, or strong hair-pins will do equally as well, some very fine, light sandy soil or road grit from flint roads is preferable, and a trowel completes the articles necessary for the operation.

Loosen the soil round the plant and put three inches of fine, sandy soil on the top, remove any weak layers. It is most important never to propagate weak stock, strip off the leaves from the growth intended for layering up to the fourth pair of leaves from the top of the growth. The next operation is to cut a tongue in the growth by making a clean cut half-way through the joint below the ones where the leaves have been removed, and with a turn of the knife continue in an upward direction as far as the next joint, thus forming the tongue; or you can reverse the operation, as is done by our expert propagators, by thrusting a sharp-pointed thin layering knife through the side of the

growth cutting downwards and out just below the joint. In the case of both methods it is necessary to cut the tongue of the layer off level just below the joint, this naturally aids and quickens rooting, then bend the growth so that the tongue is pressed about half-an-inch deep into the fine soil, then pin it securely down in position. Repeat the process until there is a ring of layers round the plant, afterwards see that each layer is well bedded in fine soil, then water thoroughly with a fine rose can. Great care must be taken to see that they do not become dry until rooting has taken place, which will take from three or five weeks, after which the layers can be severed from the parent plant, but they should not be lifted for potting or planting for at least a week later, they are then ready for planting in their permanent positions or potted for wintering in the cold frame.

### Raising Border Carnations from Seed.

Seedlings of all Carnations invariably have more vigour than standard varieties, and those who are not exacting as to the finer points in a perfect Carnation, but rather a plant which will produce quantities of bloom, will find these requirements met in seedlings of Border Carnations a proportion of which are sure to come single-flowered, but a good percentage will produce double flowers. In fact you may obtain a new improved variety, whilst if the plants are left in the garden for two or even three years they will make quite large bushes producing hundreds of flowers, and a seedling

Border Carnation will flourish in almost any garden.

The best time to sow the seed is in early spring, so that the seedlings can be planted into their flowering quarters during the summer, but the seed can be sown with good success during the summer months. Full details as to sowing and raising Carnation seedlings is given in the latter part of the next chapter.

## CHAPTER VIII.

### PERPETUAL BORDER CARNATIONS.

WHEN the firm of Allwood Bros. introduced the first Perpetual Border Carnations in 1910 they received a mixed reception. Some contemporary firms claimed to have raised this new race of Carnations previously, some Horticultural papers tried to belittle them, and one powerful Carnation Society said they would ignore them, but in spite of this opposition, to-day the Perpetual Border Carnation is admired and recognised by all, simply because it is impossible to hide or blot out a good new race of plants.

This new section of the Carnation was in the first place created by interblending the old British Border Carnation with the modern varieties of Perpetual-flowering Carnations, a process which was only achieved after much labour, patience, disappointment and expense. This will be more readily appreciated when it is understood that the Border Carnation, which is a direct descendent from the specie (Dianthus caryophyllus), is quite distinct from the Perpetual-flowering Carnation. The latter is

ALLWOOD BROS.' PERPETUAL BORDER CARNATIONS IN KEW GARDENS.

to a large extent, if not entirely, a development from the Indian Pink (Dianthus Chinensis), so that it will be seen that the intermixing of these two separate races of Dianthus with their distinct habits of growth and other characteristics was not an easy task, at least not to get an equal blending of the excellent qualities of both.

The object was to retain not only the perfectly formed flower and compact low-growing habit of the Border Carnation, but to instil the perpetual growing and flowering nature of the Perpetual-flowering Carnation, and, withal, to have a hardy, robust growing plant.

The cultivation of the Perpetual Border Carnation is simplicity itself; you can grow it in exactly the same way as you do the old Border Carnation by planting the young plants out of doors in the spring or autumn as advised in Chapter VII. on Border Carnations. They will flower profusely during the summer and well into the autumn, in fact we have gathered the last Carnation of summer from the garden on Christmas Day. The plants are exceedingly hardy, and bloom even more profusely during the second year provided the flowers are cut and not allowed to die upon the plants. The means of propagation during the summer is by cuttings, and the directions given for rooting cuttings of Allwoodii (see Chapter X.) holds good, or you can take layers as advocated for propagating Border Carnations, with this single exception, when the latter is rooted and the growth commences to elongate for flower this should be stopped (the top broken off at the

sixth joint or pair of leaves) so as to induce the young plant to make side breaks.

The other method of cultivation is to grow them in pots precisely the same as you do the Perpetual-flowering Carnation, the difference is that they are not quite so free flowering in mid-winter, but more so during the spring and summer, while it is undoubtedly the ideal cold greenhouse Carnation. The instructions given regarding feeding with a cool, slow-acting, specially prepared Carnation food should be followed out.

### Raising Perpetual Border Carnations from Seed.

One of the greatest advantages of the new race of Carnations is the great success with which they can be raised from seed. Many have obtained 100 per cent. of double flowers, so that this fact alone is sufficient to warrant them being sown in preference to the old Border Carnation for flowering out of doors, for when it is remembered that the seedlings bloom within nine months from the date of sowing and is continuous flowering, whereas the ordinary Border Carnation requires from twelve to eighteen months, this modern improvement will be appreciated.

The seed can be sown during any month of the year, but naturally the best seasons are autumn or early spring, so that the seedlings can be planted in the garden during spring, when they commence to flower in the early summer; but to do this sucessfully a mildly

The perfect form and colour marking obtainable in Perpetual Border Carnations.

heated greenhouse or frame is necessary (not less than 45 degrees), but the seed can be sown in a cold greenhouse or frame with good results in the spring or early autumn, or out of doors in the summer providing specially-prepared soil is made for sowing into, and germination is encouraged by covering the seed with glass shaded with paper from strong suns. It is difficult to raise any Carnation seed when sown direct out of doors, unless they are covered with glass and otherwise protected by artificial means, because uncovered they are too much at the mercy of scorching suns, drying winds, heavy rains and birds.

### Sowing Carnation Seed.

The common fault in sowing Carnation seed is that invariably this is sown too deeply; the best method is to get a shallow six or seven inch pan, or a shallow box will do providing there is free drainage, whilst a five or six-inch pot can be used if it is partly filled with crocks or ashes. Have a light, sandy soil composed of two-thirds maiden loam or sweet soil and one-third sharp sand, fill the pan, pot or box to within half-an-inch of the top and water with a fine rose-can to firm the soil, afterwards sow or place the seed about a quarter to half-an-inch apart and sprinkle over them just sufficient light, sandy soil to cover the seed, but no more, finally give the whole a light rose over. During cold weather the receptacle should, if possible, be stood where a little artificial bottom heat can be obtained so that germination is assisted. Place over the top of

the pan a sheet of glass, and over this a sheet of thick paper to exclude the light, the glass, if possible, should be turned once or twice a day to get rid of the condensation, but as soon as germination commences the paper should be removed, except in very sunny weather, when the seedlings must be protected from the strongest suns or they will be scorched up. When the seedlings are sufficiently strong to withstand full sun and light the pan should be stood in a light, airy position, a shelf in a greenhouse is ideal except in summer when it is too hot and dry.

It will be readily understood that if the soil is allowed to become excessively dry the seedlings will be seriously checked if not spoilt; whilst on the other hand, if the soil is kept too wet they may damp, so that discretion in watering is necessary.

### Pricking Out the Seedlings.

When the seedlings have commenced to make their second pair of true Carnation leaves they should be pricked out into pans or boxes of about 3-in. to 4-in. deep.

They should be placed from two to three inches apart, and planted in the soil up to the condolyin leaves, and the soil should be reasonably firm around their roots. They will require keeping moderately close in a frame or greenhouse for a few days, and should be shaded from the strongest sun. After the first watering in with a fine rose-can, watering should be withheld until the soil commences to dry,

except in bright warm weather, when a light spray overhead should be given until the seedlings are established, after which they should be treated as growing Carnation plants, and potted on or planted out of doors as required.

### Perpetual Border Carnation Seedlings for Summer Bedding.

The practice of raising Carnation seedlings for flowering in the garden during the summer is becoming increasingly popular, and the new Perpetual Border Carnation is the ideal section for this purpose. The best practice is to sow the seed in the late spring or during the summer, growing them on in the way previously advised, and either plant the seedlings out of doors in early September or else winter them in 3-in. or 5-in. pots in a cold frame or cold greenhouse. As a rule the seedlings do not require any stopping, but if a bud is being formed in the late autumn, this should be removed with a few inches of stem.

### General Cultivation.

For the various methods of growing this delightful new race of hardy Perpetual Border Carnations, the reader should follow the advice given in Chapter IX.

### Summer Bedding.

I feel that it is outside my province to suggest suitable combinations for Perpetual Carnations in summer, because this is more a matter of taste, and many delightful combinations will

suggest themselves to an imaginative mind. Personally, I prefer the Carnation and Allwoodii alone, although I have seen beds of them carpeted with Violas made to look delightful. The plants in those beds were set fairly wide apart.

Perpetual Carnations in window-boxes, on balconies, or in rock gardens, also look well, while large tubs or vases filled with them, particularly in the case of two-year-old plants, have a unique effect, and produce quantities of flowers. I have also seen window-boxes where some of the plants were unsupported, and allowed to hang down like Ivy Zonals. This is quite a common practice on the Riviera. I know a gardener who annually has beautiful Carnations growing in baskets. These are not disbudded, and produce a very pleasing effect.

## CHAPTER IX.

### THE CREATION OF ALLWOODII.

FOR many years we have realised that with the great development and competition of other flowers, the Pink, in its present form, could never hold a prominent position in our best gardens, and so we set to work to create a plant which was Perpetual-flowering during the entire spring, summer and autumn; which was exceedingly hardy, robust, and easy to cultivate, and yet at the same time had the perfect perfume and lovable flowers of the Pink, in short, a plant that really was a Perpetual Pink in actual being, and not simply in name. We could see that the excellent work done by other raisers was not such that would elevate the homely little Pink to its rightful position in the floral kingdom, so we decided to make a new start and work upon our own lines. From the first we intended to develop a plant for the million as well as the millionaire. Above all a reasonable plant that is, one which, if so required, would flourish upon a railway bank; one that was practically fool-proof and required no skill to cultivate.

We also strove to develop a plant which would find a place in every garden, so that a garden would not be considered a garden that did not possess it; a plant with an iron constitution that would flourish equally as well in the Highlands as in the Lowlands, in a large smoky city and in the sunny country, in the highly cultivated garden and on the heath, on the sea coast and inland: in the rocky garden or dry walls equally as well as in the border; a plant which would flourish in wet or dry seasons and yet flower perpetually with all the various colours of a Carnation, and possess the scent and old-world charm of the simply lovable little Pink. We felt practically certain that such a development from Dianthus Plumarious was possible. What measure of success we have achieved we prefer to leave to the judgment of others.

### Propagating Allwoodii.

Many amateurs and private gardeners look upon the propagation of plants as something which requires special skill, and no matter how correct this may be with some plants, in the case of Allwoodii, it is not so. The propagation of no plant could be more simple. There are three primary methods of propagation, viz., by cuttings or pipings, layers, and divisions. At present it is impossible to perpetuate any named variety from seeds, and we question if this ever will be possible (certainly not for a number of

A SPRAY OF ALLWOODII.

years) owing to the great differences and variation of the parents and the fact that they are a hybrid race.

### Propagation by Cuttings.

The new race of plants, Allwoodii, in nearly all respects, resembles the old Garden Pink, except that it commences to bloom earlier, and the majority of its varieties are stronger growing, but it is distinct in this one great respect, that it is perpetual growing and flowering during the spring, summer and autumn. But this fact alone makes its culture much more easy than the Pink, simply because cuttings can be inserted with good success during any of the three growing seasons named. However, the best months are late May and early June. We strongly prefer heel cuttings. These are the short growths found at the base of each branch, and about three inches long. These are easily removed with an outward and downward pull, and the cuttings come away from the parent plant with the heel complete. The small lower leaves should be removed, otherwise when buried in the rooting medium, they are apt to cause the cutting to damp off. We do not favour the trimming of the end of the longest leaves, simply because it places an undue strain upon the cuttings at a critical period, but all leaves which curl round so that the ends touch the rooting medium should be shortened back. Further, if a tail of bark remains on

the heel of the cutting, this also should be removed, but a razor-like knife must be used.

### Piping Cuttings.

Propagating by piping is practically the same as propagation by cuttings. In short, it is the old method of propagating many members of the Dianthus family, and it is simply a growth pulled out at the socket of a joint. If you give the growth of any Dianthus a sharp pull, providing the growth is in a half-matured state, it severs at a joint, and if inserted in a suitable medium emits rootlets freely. This practice is advisable if only correct cuttings are used, but if you take the end of a growth which is elongating for flower, you cannot possibly obtain a strong vigorous plant, simply because you do not commence with a complete growth. You have the top portion, while the bottom portion is that from which the natural breaks are produced, and naturally the part which is essential for propagating purposes. To put the whole matter in a nutshell, the leaves of a growth used for propagation must be quite close together. If there is space between the leaves, the growth is unsuitable. The leaves of a piping should be prepared as advised for cuttings, and in both cases the piping or cutting should be removed from the parent plant in the early morning when they are perfectly stiff, and put into a damp airtight box away from the sun. At no time should a piping or cutting be allowed to wilt. We always remove our

A COTTAGE GARDEN

cuttings in the early morning, before the sun gains power.

### The Best Rooting Medium.

A sharp clean grade of sand (two-thirds) and very finely sieved loam (one-third) is undoubtedly the best medium to root cuttings or pipings in. Sand obtained from the river or the sea shore is excellent if washed. We have a special sand, the same as we use for propagating our Carnations in. Of course, silver sand is excellent, except we do not favour the very coarse grade. Fine road grit from flint roads is good, but this should be thoroughly washed before using.

### Rooting Cuttings and Pipings.

No matter what month you are carrying out your propagation, from May to September, the following directions hold good. The cuttings or pipings must never get dry at the base, or must a powerful sun ray or cutting wind strike directly upon them. If this take place, your attempt will be checked, if not entirely spoilt, while excessive shading or watering is injurious. Place the propagating medium into shallow boxes, pans, pots, or similar articles, water thoroughly, using a fine rose, and press it firm, and dibble each cutting in about an inch apart, taking care to press the compost round the base of the cutting to exclude the air, also see that the cutting is not put in too deep and that the base of each cutting rests upon the compost, thoroughly water with a

fine rose can, this will firm the compost round the cutting. Place the whole under a frame light or hand glass or box with glass over the top, admit fresh air for an hour or so each morning, and shade from the strong suns, while in very bright weather, the cuttings should be sprayed overhead each day. Under these conditions, a cutting will take from two weeks to a month to root, and as soon as this has taken place, gradually harden them off, so that they can withstand light and air. Other methods would be to put about four inches of the rooting medium at the bottom of a large pot or box some twelve inches deep. This could be stood in a position where there is shade from the strongest sun, or four inches of rooting medium could be placed at the bottom of a frame, and the cuttings inserted into it. There are innumerable ways of rooting Allwoodii, in dull damp spells, we have rooted cuttings entirely out of doors by simply placing them in ordinary garden soil or under a hand light.

### Propagation by Divisions.

Plants of any variety of Allwoodii will continue to grow and flourish for upwards of three years, but after the second year they become rather hollow in the centre, they also have a somewhat rough appearance, and the easiest method of propagating such plants is by division. During the summer, put a shovelful of light soil in the centre of the plant at the base of the main branch, and keep it reasonably moist. This causes roots to be formed at the

base of the branches. If you dig up the old plant in late March, you will find that it has made a mass of small roots. Pull the branch away from the parent stem, and you have a distinct plant, or you can divide the plant as described without any previous preparation, but this method is rough treatment and not as a rule so successful. If you break off a shoot in late October, and plant it firmly, it will as a rule take root and bloom freely the following summer.

### Raising from Seed.

Instructions are given for raising Carnations from seed in the latter part of Chapter VIII.

## CHAPTER X.

### CULTIVATION OF ALLWOODII.

IN the case of a plant so easy to cultivate as Allwoodii, details of culture are superfluous, for we believe that there are few, if any, gardens where Allwoodii cannot be grown with good success, but the gardener with no imagination or determination will imagine difficulties and obstacles. Failing is the only thing he succeeds in with any measure of success.

The new plant, Allwoodii, is no exception to other flowering plants, and must have a direct light to produce satisfactory results, that is plants would not succeed well under a large spreading tree, or behind a north wall, but almost any other situation suits it admirably.

#### Growing the Young Plants.

We have seen in the previous chapter how to propagate Allwoodii, which can be carried out at any period from April to September, in cold frames, or at any other time in mildly heated greenhouses; however, summer propagation is the best. Cuttings or layers rooted in

Allwoodii
growing
in the Country
and in a
roof garden in town

early summer, and planted in the garden in August or September, would naturally commence to flower during late Autumn, but this should be prevented by pinching off the tops of the plants at the sixth pair of leaves from the surface of the soil until the winter commences, when the growth stops and the plants lay dormant. In the South of England, the plants commence to flower each spring in May, but in the Midlands and the North it will be June before the first flowers are produced. Of course, the plants flower perpetually until the severe frosts of winter commence, yet repeatedly we have gathered the last Allwoodii of summer in December.

From the foregoing it will be seen that the young plants can be planted in their flowering quarters at practically any season of the year, in fact after a cutting is well rooted and hardened to withstand strong sun and keen winds we consider it best to plant it direct into the garden in preference to potting it, and the same applies to rooted layers.

### Treatment of Allwoodii.

The general treatment of the plants is practically the same as that given to other outdoor hardy plants, the ground should be kept free from weeds, and in dry weather hoeing the soil so as to keep the surface loose is important, for this acts as a mulch, preventing the soil from drying, also keeps the roots cool, in very hot weather, and a greater quantity of finer flowers resulting. Watering the plants

is not necessary, except in the case of freshly planted stock in dry hot weather. Regarding the preparation of soil see Chapter III.

### Feeding.

Allwoodii, like all members of the Dianthus family, does not require a very rich soil. We always dig in old yard manure, previous to planting, at any season of the year if the soil is poor, but there is no advantage in doing so, otherwise in fact top dressing as per directions of Allwoods' Carnation Food in spring, summer and autumn, is far more beneficial to the plants. This organic food contains all that the Dianthus requires, in graduated quantities of the various elements of plant life, and prevents a too rapid soft growth so harmful to all Dianthus.

### Disbudding and Cutting Bloom.

Disbudding is not necessary with Allwoodii, however some varieties are improved by having some of the buds at the top of the spray removed, but of course the semi-double flowered varieties are best left undisbudded. For cut flowers grown precisely for market sales, we simply remove the top crown bud, so that the lateral buds form a spray.

We strongly advise the flowers being cut with long stems. This is much better for the plants, also the flowers themselves display their natural beauty. If the sprays of bloom are cut with a number of buds yet to develop,

these open in water, and last for a month under careful attention in a cool room.

### Winter.

During the winter practically no attention is required, except that great care should be taken that after very severe frosts the young plants are not lifted out of the ground, particularly those planted in the autumn; these should have the soil firmed round the roots. On no account must the plants be mulched with yard manure. This encourages surplus moisture around the collar of the plants and will cause them to rot off, while if allowed to grow unprotected will come to no harm, firmness of the soil being the main factor during the winter months.

### Autumn.

Plants which have been growing and flowering freely during the summer, should have any long growths or old flower stems cut hard back, otherwise the wind is apt to break off branches of those situated in exposed positions. We have found that autumn pruning is best done in September. It is not wise to cut back every growth, but only the longest, so that the plants look a bushy tuft, and from such a plant the best results are obtained the following spring.

### Forcing Allwoodii for Early Bloom.

One of the most popular ways of growing Allwoodii is to force the plants for early bloom in March, April and May. The best way to do this, is to keep all buds and flowers removed from the plants during the summer, lift the

plants from the garden in August or September, only removing the loose soil, and pot them into six-inch pots, using a similar soil to that used for potting Carnations and Chrysanthemums; avoid leaf-mould, or more than one quarter of old yard manure, and pot firmly. The plants should be given a light spray overhead with a rose can once or twice upon bright days, and stood in the open, or they can be stood in a frame with an abundance of air, and shaded from the strongest suns for a few days until they become established, but the system of not shading them is perhaps the best. The plants should be grown perfectly hardly until October, when they are best placed in a light, well ventilated cold frame to shield from the heavy rains, or good results are obtained if the plants are left out of door during the winter, and this is preferable to placing the plants during the winter in a heated greenhouse. In January some of the plants can be put into a greenhouse, not exceeding 45 degrees at night, with good light and abundant ventilation during the day, in fact the plants should be treated as if they were Carnations. Different batches can be brought in each month, so that a succession of bloom is maintained.

Another way is to lift the plants from the garden in February, pot them, and place them in the greenhouse, but this method does not produce such good results.

### Allwoodii for Late Flowering.

If some plants are grown during the summer in a position where all the buds are removed

from June to late August, and covered with frame lights in late September, then give an abundance of ventilation on all favourable occasions. Such plants will continue to supply quantities of bloom until late December.

For market we have a rough way, it is to lift the plants when full of bud in late September, and pot them or plant them in shallow boxes, then the plants will continue to produce quantities of flowers until December in a greenhouse.

A better plan is to remove all buds from the plants in the garden until late August, lift and pot the plants in July, treating them as directed for forcing. If the plants are then placed in the greenhouse in mid-September, they will produce excellent blooms until mid-winter.

### Allwoodii in the Cold Greenhouse.

Some of our friends who have cold greenhouses have obtained wonderful results by growing Allwoodii in pots, precisely the same way as you would the Perpetual Carnation, and the plants continue to bloom nine months out of the twelve. This method of cultivation, I think, will become more popular as it becomes known, particularly in and near towns.

### Allwoodii in Window Boxes.

For this purpose we have obtained most satisfactory results from summer propagation stock grown out of doors in pots, but winter in a cold, well ventilated frame and planted into the window boxes in March or April. If per-

ferred, the early buds can be picked off and the plants potted into larger pots in early March, and planted in the window boxes in May or when required.

Good results are also obtained by lifting plants from the garden in March, and planting them in window boxes, or if the buds and flowers are picked off the plants a few weeks previous to disturbing them, they can be lifted and potted or planted in window boxes at any period during the spring and summer, and such plants will recommence to flower about a month after being disturbed.

### Allwoodii in Dry Walls and Rockeries.

One of the greatest charms of Allwoodii, particularly varieties that are low growing, is the easy way they can be successfully grown in dry walls and rockeries, and the beautiful effect obtained by growing them in this way is one of the greatest advantages of the plant, further they are superior to all other rock plants, because they flower perpetually.

It is unnecessary to go deeply into this method of culture, because, so far as Allwoodii is concerned, nothing could be more simple, but the plants must receive careful watering and attention when newly planted, which is done with the best success in the autumn or very early spring before the hot weather commences. Care should also be taken to see that the plant has sufficient soil in the first place to establish itself, yet the pocket or recess must have adequate drainage, otherwise the

ALLWOODII IN A RURAL RETREAT.

plant will become water-logged during the winter.

### Allwoodii in Baskets.

The simplest way to grow plants in baskets is to line the basket with moss, afterwards fill it with soil of the same compost as previously described, then plant the plants, selecting trailing varieties for the outside, and compact growing kinds for the centre. We have always found it best to plant baskets in February or March, afterwards standing them in a cold frame to become established, then they can be hung in practically any position, those with a good light being preferred.

The two essentials are that the plants must never become dry, and once a week should be thoroughly soaked, also they should be fed with special Carnation Food.

### Allwoodii in Pots on Window Sills.

Plants flourish admirably on window sills during the entire year, and produce an abundance of bloom from spring to winter if the few following details are attended to. Commencing with flowering plants in the spring, which should be potted into six-inch pots, using soil as previously advised, and stood upon the sill, a direct light being a great advantage. The plants should never be allowed to suffer through drought, yet to over water them by keeping the soil perpetually saturated is equally harmful. To obtain the best results, Carnation Food should be given after the plants have

become established about once each week during the spring and summer.

### Allwoodii in the Herbaceous Border.

The many ways to grow this adaptable plant will suggest itself to any true gardener, and the herbaceous border must not be overlooked. A clump of Allwoodii is an attraction all the summer while their use as a carpeting under standard roses, or as an edging to a bed, is difficult to improve upon, unless it is a bed of Allwoodii standing alone.

### Allwoodii at Flower Shows.

It is a happy fact that at all the leading flower shows from spring to winter we see Allwoodii shown in vases with their own and any other foliage; in baskets and bouquets, whilst for table decoration they are almost unique. There are varying forms and colours, and the glorious variety all lend themselves admirably to floral displays.

## CHAPTER XI.

### PESTS AND DISEASES.

I INTEND to deal with pests and diseases more from a practical than a scientific standpoint. Some scientific men who lack a practical grower's experience may not entirely agree with some of the methods we employ, but the proof of the pudding is in the eating: our methods have proved effective almost without exception, and to be employed by a large commercial firm such as ours they must be economical. I, of course, have a great advantage in being associated with a large firm, who cultivate Carnations by the acre under glass, as well as in the open, and where an expert is employed at the head of every department who is thorough master of his section of Carnation cultivation. I believe that there is no Carnation pest or disease which we have not mastered, and, furthermore, I believe that if others follow out our methods of cultivation, they will not be seriously troubled with disease upon their Carnations, no matter whether they are grown under glass or in the open.

The two main factors in having healthy Carnations is to start with a clean, selected,

healthy stock, and only to propagate *correct* cuttings and layers (see Fig. 3). Just any sorts of stock-cuttings or layers (see Fig. 3c) will not do, and, moreover, when once a Carnation plant has become weak or unhealthy it is almost impossible to restore its health, particularly so in the case of perpetual-growing varieties, simply because they have no resting or dormant period to recuperate their health: furthermore, all perpetual-flowering varieties deteriorate in time, and their constitution can only be preserved by selection and cultivation.

The second essential in good Carnation cultivation is the use of a correct fertiliser. I will go so far as to say that more Carnations are spoilt annually owing to the use of improper fertilisers than from any pest or disease. Half of the highly concentrated fertilisers used upon Carnations simply act as a stimulant, and undermine the constitution of the entire stock. A Carnation, to preserve its constitution, must have an evenly-balanced, slow-acting, organic food, one that develops all parts of the plant. If you endeavour to develop a flower abnormally, say, for show purposes, at the expense of the plant, then your stock becomes ruined. An organic food in comparison with a chemical stimulant is like the body-building and lasting qualities of a beef steak to a whisky and soda. Excess of nitrogen in a highly concentrated fertiliser has ruined thousands upon thousands of Carnations.

Another matter to be considered when dealing with Carnation pests and diseases are the conditions under which the plants are grown.

Fig. 11.
Rust.

Fig. 12.
Spot.

A Carnation plant must have light and air. There is no known substitute for that. If you coddle Carnations unduly, you ruin them.

That brings us to another vitally important matter in the cultivation: the soil or compost in which they are grown. A soil too rich, or the addition of leaf-mould, if persisted in, will cause deterioration in the plants. A Carnation enjoys a firm, sweet, moderately open soil.

The special diseases of the Carnation are:—

### Stem Rot (Rhizstonia).

Of recent years this has become, perhaps, the most common among Carnations. It gives the grower no warning, the plants' stem diseasing just above the soil. This disease is more common among Carnations which are propagated by means of cuttings than in layers. Some growers contend that it is hereditary, but we do not agree with this contention, although certain varieties are more subject to it than others. In our opinion, it can be prevented, but not cured. We have proved that it is brought about by two causes, the principal one of which is rooting the cuttings in unsuitable sand, such as a sand that contains iron in large quantities, or one very fine in texture, which practically turns to mud when watered, and settles down like cement. This quickly turns sour. Also, if the cuttings are allowed to remain too long in the sand after rooting they become hardened and checked. Deep potting will also cause stem-rot: in fact, we have

found that stem-rot commences at a buried joint, and it is most essential that as little of the stem of the plant should be buried as possible. As a preventive, we give occasional top dressings of pulverised limestone.

### Fungus Diseases on Carnations.

The principal diseases are Rust (Uromyces caryophyllinus) (figure 11), Spot (Septoria dianthi), and Fairy Ring Spot (Heterosporum echinulatum) (figure 12). What I particularly wish to point out here is that under correct cultivation, if the plants are given normal treatment, no fungus disease will troble you. A close, moist, humid atmosphere will encourage fungus disease, but a fresh buoyant atmosphere will destroy it. Many of the remedies advised simply aggravate the disease, ruin the plants, and destroy the bloom upon the foliage. This does not apply to plants grown under glass only, but also in the open. A simple and effective method for combating a fungus disease on Carnations is to cut off all affected leaves and burn them, and dust the plant with a mixture of sulphur, air-slacked lime, and copper sulphate, previously prepared and treated. This destroys the spores of the disease without affecting the foliage of the plants. During the summer months, when the atmosphere is hot and dry, we use an occasional spraying of the plants with a liquid preparation of copper ammonia and distilled water, as a preventive. However, for the amateur or private gardener we prepare a special fungicide powder for

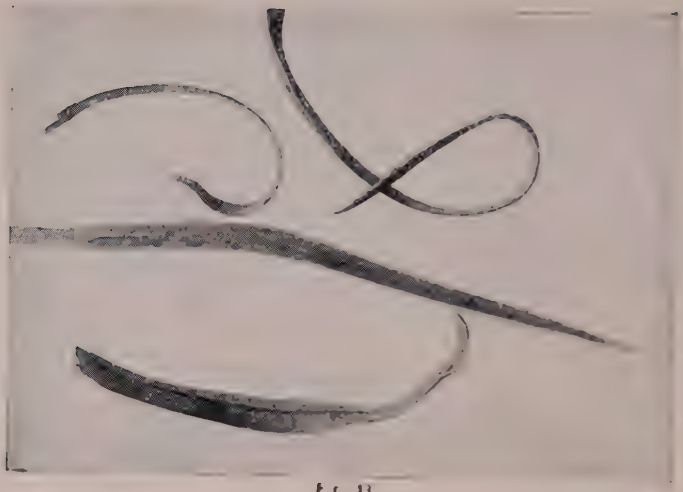


Fig. 13

Red spider.

**Fig. 14.**

Two outer buds showing the ideal calyx. Two centre buds interior calyx, which often split.

winter use, and a liquid fungicide for use during the summer months.

### Bacteriosis or Stigmonose (Bacterium dianthi).

In appearance, this is simply yellow, translucent spots on the leaves, which are destroyed cells, and are seen very plainly when the leaf is held up to the light. In the Spring of the year these yellow blotches are much more noticeable on the leaves, particularly in certain varieties. The disease is caused in the first place by green-fly, thrip, or other sucking insects, which leave a poison in the leaf when the proboscis is withdrawn. If the constitution of the plant is weak this poison permeates the whole plant, and is increased by propagation of the cuttings of layers, but if the plant is constitutionally strong it can throw off the poison. It continues to grow freely and healthily, providing all other cultural details are correctly carried out. Of course, it is not a contagious disease, but it is idle folly to propagate from affected plants. To stamp out Bacteriosis it is not only necessary to select strong, healthy cuttings, but to propagate from vigorous healthy plants only.

### Red Spider (Tetranychus telarius).

This is a small pernicious red mite, which attacks the old or fully developed leaves, it increases very rapidly, and quickly spoils a plant by causing the leaves to turn a dull rusty colour, and afterwards to die (see Fig. 13). It attacks Carnations, as a rule, during June, July

and August, owing to the atmosphere being too hot and dry; weakly, unhealthy stock invites it. Again, if the growth of the plant is checked through improper feeding or lack of potting, and neglect to syringe the plants thoroughly and periodically in hot, dry weather, or in the open without rainfall, the best and only really effective remedy is to syringe the plants at very high pressure on bright mornings, so to break the web and reach the mite, particularly the under sides of the leaves, with clear cold water, and once every fourteen days with Allwood's Insecticide Spray, specially prepared for Carnations, avoiding preparations which contain soap extracts, or similar compounds, which leave a deposit upon the leaves, and are more harmful than beneficial to the plants.

Aphis and black-fly, are the simplest of all pests to eradicate. A single application of Allwood's Insecticide Spray is sufficient to cleanse the plants entirely. The antiquated system of fumigating, so far as Carnations are concerned has proved, with us, more harmful than effective, inasmuch as the life of the flower is shortened, the growth of the plant is checked and only the active pest is destroyed. Furthermore, we are of opinion that the fumes have certain detrimental actions upon the soil, and we are extending our experiments on a large scale to test this theory.

### Thrip (Heliothrips tabaci).

One that troubles the Carnation-grower, and appears to be Nature's gift to all Horticulturists,

**Fig. 15.**
Held-up growths.

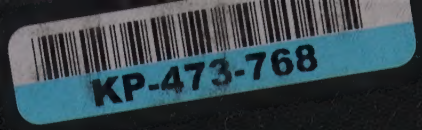
disfigures the flowers during the summer and early autumn, and is effectively destroyed by periodically spraying with the same Insecticide Spray which I have previously recommended for red spider.

### Split Calyx.

This, of course, is not caused by any pest or disease, but in the case of proved varieties is the result of irregular growth, caused by irregular conditions in the soil, affecting the growth of the roots, or irregular climatic conditions affecting the growth of the plant, or, as is too often the case, the use of unsuitable fertilisers. The ideal calyx, with well-rounded calyx-claws—which act as a spring, as seen in the two outside buds (see Fig. 14)—rarely, if ever, split, while the tube-like calyx of the two centre buds are very subject to this weakness. The holding up of leaf-tips in the spring (see Fig. 15) is also caused by irregular conditions or a check, and the only remedy is to give the plants better cultivation and liberate the outer leaves of the young growth.

Soil pests include wireworms, the three species of Agriotes, eel worm (tylenchus devastatrix), leather jacket grub (Tipula oleracea), earthworms, etc. We deal with all these in the same way, by ploughing up in the spring of the year four to six acres of grass turf, sufficient to supply our year's soil requirements from the following autumn. This is ploughed from four to five inches, and a large

number of chickens are allowed to pick it over. When the grass is partly killed it is cross-ploughed, afterwards scarified, then harrowed. During all this time the chickens are picking out the insect pests, and in the late summer when carted into the soil sheds there is little to trouble about so far as insect pests are concerned. But for our special seedlings and novelties the soil is sterilized by steam. This we do during the summer when the soil is very dry, so as not to spoil its texture. We are well acquainted with all the soil fumigants and other methods of ridding soil of insect pests, but, for practical business men, something must be found more effective before they will be generally commercially adopted. If we are troubled with wireworm in any of our commercial cut-flower houses or trial beds, in the fields where Allwoodii and Perpetual Border Carnations are grown, we resort to the primitive method of trapping the pest with pieces of carrot or potato, buried just under the surface of the soil. This work is done by school children, who are paid so much a hundred insects caught, and we very easily and cheaply clear the ground; but where the soil is firmly trodden or rolled, little trouble from soil pests need be feared.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